

Chapter 11

Case Study I: The World Health Organisation, by Ana Mulió Álvarez



11.1 Philosophical Considerations

The world currently faces the greatest challenge ever experienced by humankind. Climate change and environmental degradation threaten nearly every ecological cycle and living organism. Humans have disrupted the bio-sphere: from the composition of the atmosphere to the nutrient cycles of the soil.¹ As recently stated by the UN “75% of land environment and some 66% of the marine environment have been significantly altered by human actions.”² We are already experiencing changes in precipitation patterns, rising sea levels, and stronger and more destructive storms due to climate change.³ In a recent study, UK researchers found microplastics in every marine organism surveyed, in fact, by 2050 plastic will outweigh fish in the ocean.^{4,5} Such realizations inevitably lead us to wonder about how we got to this point and what we are going to do about it. More specifically, what is our role and purpose in our relationship with the environment? These concerns are deeply philosophical and real. The institutional compass provides a practical tool and a holistic framework of analysis for these complicated philosophical and political inquiries.

By analyzing an institution through an ecological economics ideological orientation, the compass helps us to understand the contribution of an institution to the

The footnotes of this chapter are references for sources of data.

¹<https://www.sciencedaily.com/releases/2009/06/090604144322.htm>

²<https://www.npr.org/2019/05/06/720654249/1-million-animal-and-plant-species-face-extinction-risk-u-n-report-says>

³<https://climate.nasa.gov/effects/>

⁴<https://www.theguardian.com/environment/2019/jan/31/microplastics-found-every-marine-mammal-uk-study>

⁵https://www.washingtonpost.com/news/morning-mix/wp/2016/01/20/by-2050-there-will-be-more-plastic-than-fish-in-the-worlds-oceans-study-says/?noredirect=on&utm_term=.2b05bca5f32e

environmental puzzle we are trying to solve. In this way, an ecological economics institutional compass proposes a change of paradigm for institutions: the economy should not shape society and the environment, but the other way around. We use it to challenge institutions to question their priorities to ensure the survival of the human species: what is the institution's relationship towards the environment and society? What does our future look like if we continue to ignore the physical reality of our dependency on our planet and its ecological goods and services? Unfortunately, the answers to these questions are becoming clearer with every season.

11.2 The Institution: World Health Organization

I have chosen the World Health Organization (henceforth: WHO) as the institution to analyze for many reasons. First, it is a well-established institution with a lot of reliable information that can provide a robust analysis. Second, it is an extremely relevant institution as the leading international organization for public health. Particularly now in recent times with the development of the COVID-19 world pandemic, public health leadership and consensus is more important than ever. Thirdly, I chose the WHO because of its focus on health. I believe health to be the key indicator of well-being that can be observable in all three spheres of the ecological-economic compass. I also believe that the objective of “good health,” while still somewhat subjective, is a widely shared cultural goal making this analysis relevant and useful. I hope that by reframing the WHO under an ecological economics analysis, afforded by the institutional compass, I shall provide insight into some of the ways we could really improve public health around the world.

To begin the analysis and get a sense of how the organization works and its goals, it is informative to look at its mission statement: “our goal is to build a better, healthier future for people all over the world.” The WHO's constitutional principles are as follows:

- Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.
- The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, and political belief, economic or social condition.
- The health of all peoples is fundamental to the attainment of peace and security and is dependent on the fullest cooperation of individuals and States.
- The achievement of any State in the promotion and protection of health is of value to all.
- Unequal development in different countries in the promotion of health and control of diseases, especially communicable diseases, is a common danger.
- The healthy development of the child is of basic importance; the ability to live harmoniously in a changing total environment is essential to such development.

- The extension to all peoples of the benefits of medical, psychological, and related knowledge is essential to the fullest attainment of health.
- Informed opinion and active co-operation on the part of the public are of the utmost importance in the improvement of the health of the people.
- Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures.

These principles provide a deeper look into the priorities of the institution and give us a sense of what the analysis may find. The initial mission statement is vague and limited to “improving health for all people” which only considers the socio-sphere, meaning it only considers the health of human beings, not that of other beings, ecosystems, etc. The constituting principles, do provide a definition of health “A state of complete physical, mental and social well-being”. The principles also emphasize that health is a fundamental right to every person regardless of race, religion, etc. This will be a key point of analysis. Does the WHO formulate policies that bring health to everyone equally, or does it prioritize the wellbeing of Western nations? While the main focus remains in the socio-sphere, there are some hints of the consideration of the econo-sphere as “unequal development” is mentioned as a danger to health, implying development must occur everywhere, similarly, for the success of public health. However, as we know, it is often Western-style economic development that is to blame for world health issues. In the constitution, there is only one reference to the “environment” but it is not clear if it is a reference to the natural environment or to the social environment: “Healthy development of the child is of basic importance; the ability to live harmoniously in a changing total environment is essential to such development.” Thus, we already notice that the emphasis is on the socio-sphere, and there is a woeful neglect of the eco-sphere and its effect on the health of humans, or of the effects of the econo-sphere on the eco-sphere. The shortsightedness of the WHO in neglecting these important relationships will be revealed by the ecological economics institutional compass and the analysis.

11.3 Methods

- (i) This case study will create an institutional compass of the WHO under the ideological framework of ecological economics. It will entail the construction of three compasses, one per sphere (eco-sphere, socio-sphere, econo-sphere). Following Friend’s methodology, each sphere will be divided into the three qualities (discipline, excitement, harmony). The indicator table will be organized by both spheres and qualities. There will be roughly 10 selected indicators per quality and per sphere, with a total of roughly 90 indicators which should provide certain robustness to the analysis.
- (ii) The process of establishing arrow length will be subjective because there is no comparable institution and because of limited time and resources. The ideological principles will be those of ecological economics. The analysis is both a

social scientific exercise and a deeply philosophical evaluation of the institution. A thorough explanation of how each length was determined will be detailed in the next section. Generally, lengths will be determined in comparison to other indicators, the strength of the quality, and the impact of the indicator in achieving the mission of the institution. Establishing arrow degrees will also be the result of a deep philosophical and analytical process explained in further detail in the next section.

11.4 Critique of Data

All indicators were selected because they contributed meaningfully to the reflexive exercise of the compass. Data was selected that was as up-to-date as possible. Because of the holistic nature of the situation, the data collection and analysis processes require the compass designer to think from different perspectives and with different priorities in mind which is one of the benefits of the tool. I wanted the indicators to capture the holistic nature of the compass as well as the complexity of the issue of public health. Because health is such a widely encompassing topic, all indicators are at some level interconnected and this connection is something I kept in mind when analyzing the data and deciding on the sphere, quality, length, and degree of the indicators. Some indicators I found by directly looking for information about a specific phenomenon I wanted to include, such as the contribution of healthcare to air pollution, others I discovered along the way and decided to include. I selected both very concrete indicators such as deaths by a particular disease, and very broad indicators such as life expectancy, to add variety and make the research as robust as possible.

Overall, most of the information available was related to the socio-sphere (human health indicators), since there was little updated information connecting the econo-sphere with the WHO and its policies and also very little information on WHO policies related to the eco-sphere (ecosystem health). While sections of the WHO website mention the importance of tackling environmental issues such as climate change and biodiversity loss for public health, specific data on WHO policies and their impact assessment was scarce. For example, the WHO indicator “Deaths Attributable to the Environment” has not been updated since 2012.⁶ Moreover, the WHO has recently changed its website and made most of its content unavailable or available only through a convoluted database. This made the data collection difficult as many links containing critical information no longer existed.

⁶WHO. (2015, June 3) “Biodiversity and Health.” *World Health Organization: Newsroom Fact Sheets, Biodiversity and Health*. World Health Organization.

Retrieved from <https://www.who.int/news-room/fact-sheets/detail/biodiversity-and-health>

In regards to the particular content of the indicators, I wanted to find indicators that showed the connections between public health programmes and their actual impact on health. For example, when working within the econo-sphere I looked at how a booming economy contributed, or not, to human health. What I confirmed is a phenomenon well known to public health experts. While a growing economy helps improve health in areas such as water and sanitation, in many cases the accumulation of wealth leads to high obesity rates, cancer, and other rich-country maladies. Therefore, in constructing the compass I found not only indicators for the priorities of the WHO, but also contradictions in those priorities. These can be explained by the contributions of the eco-sphere and the econo-sphere to the socio-sphere. Discussing these contradictions is not a mere critique of the current global public health regime but also highlights that there is hope. If the WHO changes policies to prioritize the health of the natural environment, then the health of humans is likely to improve. The health of humans depends on the health of the natural environment and on the health of eco-systems. See Sect. 7.1.

11.5 Indicator Analysis

11.5.1 *Econo-Sphere*

11.5.1.1 Harmony

- Indicator “WHO Budget in 2020–2021 was 4.840.4 million US Dollars, an 11% increase compared to 2018–2019.”⁷ I selected this indicator because under the current neoclassical economic system any increased spending that adds to the Gross Domestic Product means the economy is growing and everyone is better off. This is why the indicator is in the harmony quality. In this case, however, while the budget increased considerably, so did the financial needs of the organization due to the ongoing COVID-19 pandemic. Therefore, while it was good that the budget increased to serve these needs, it did not directly correlate with better public health, rather the contrary. The increase fell short of the needs.
 - Length: I gave this indicator a length of 0.7 because the level of growth and the importance of such increase are significant under the current COVID-19 crisis. The increase in the budget provided considerable resources to tackle the increasing needs of the global public health regime.

⁷Global Health Observatory. (2016, March 9). “Deaths Attributable to the Environment (%).” *World Health Organization: Global Health Observatory Indicators*, World Health Organization. Retrieved from [www.who.int/data/gho/data/indicators/indicator-details/GHO/deaths-attributable-to-the-environment\(-\)](http://www.who.int/data/gho/data/indicators/indicator-details/GHO/deaths-attributable-to-the-environment(-)).

- Degree: I gave this indicator a degree of 10 because I believe the indicator is closer to excitement than to discipline. The increase in spending is quite exciting, unexpected, and in terms of total numbers, rather spectacular.
- Indicator “Rates of vaccination against pneumococcal, Haemophilus influenza type b, pneumonia, meningitis, rotavirus, pertussis, measles, and malaria over the next ten years will save \$145 billion in productivity losses.”⁸ I selected this indicator because vaccinations are considered one of the greatest advances in medicine and they have an often overlooked harmonious effect on the economy. I believe this indicator is particularly relevant in the wake of the COVID-19 vaccination campaign as it provides some insight into how useful such vaccinations can be to bring balance to the economy.
 - Length: I gave this indicator a length of 0.5 because although the savings are significant, they do not appear that large if we consider world GDP.
 - Degree: I gave this indicator a degree of 10 because of the exciting potential of the indicator. Vaccinations are new and exciting discoveries that require governments and organizations to be constantly active.
- Indicator “Investments in expanding Universal Health Coverage over the next five years will result in 24.4 million lives saved. Each dollar invested will result in a return of US\$ 1.40.”⁹ I selected this indicator because it shows the positive and harmonious effect of investing in health for everyone. Improving public health has a positive multiplier effect in all spheres: it saves people, promotes a healthy environment, and it leads to economic growth.
 - Length: I gave this indicator a length of 0.8 because I believe a return in investment of 1.4 is quite positive.
 - Degree: I gave this indicator a degree of 30 because the indicator is exciting but I wanted to keep the arrow closer to the mid-point of harmony.
- Indicator “Donations to WHO to fight COVID 608,516,234 US Dollars.”¹⁰ It is a similar indicator as the first one, but more specific to COVID. The amount of economic effort put into fighting the COVID-19 pandemic sheds light on the incredible capacity of world-leading donors to come together with a common purpose.

⁸Stack, M. L., Ozawa, S., Bishai, D. M., Mirelman, A., Tam, Y., Niessen, L., Levine, O. S. (2011, June 30). “Estimated economic benefits during the ‘decade of vaccines’ include treatment savings, gains in labor productivity.” Health Affairs. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/21653952>

⁹Stack, M. L., Ozawa, S., Bishai, D. M., Mirelman, A., Tam, Y., Niessen, L., Levine, O. S. (2011, June 30). “Estimated economic benefits during the ‘decade of vaccines’ include treatment savings, gains in labor productivity.” Health Affairs. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/21653952>

¹⁰WHO. (2018). “A healthier humanity: the WHO investment case.” World Health Organization. *World Health Organization*. Retrieved from <https://apps.who.int/iris/bitstream/handle/10665/274710/WHO-DGO-CRM-18.2-eng.pdf>

- Length: I gave this indicator a length of 0.8 because the amount is quite significant. However, the arrow is not longer than the first indicator because the specific allocation of the funds is an assumption.
- Degree: I gave this indicator a degree of 20 because it is almost as exciting as it is harmonious.
- Indicator “WHO establishes Council on the Economics of Health for All. The Council, comprising top economists and health experts, will focus on investments in health, and achieving sustainable, inclusive, and innovation-led economic growth.”¹¹ It surprised me to find that this council was formed this year in 2021 and that such an organization did not exist before. I included this indicator because I believe it indicates that the WHO’s concept of health is becoming more holistic and inclusive, and thus more harmonious.
 - Length: I gave this indicator a length of 0.3 because while it is a positive step likely to bring harmony, its effectiveness is yet to be evaluated.
 - Degree: I gave this indicator a degree of 10 because it is almost as exciting as it is harmonious, and because it is a new idea.
- Indicator “Investments in reducing patient harm can lead to significant financial savings, and more importantly better patient outcomes. An example of prevention is engaging patients, if done well, it can reduce the burden of harm by up to 15%.”¹² I struggled to categorize this indicator but I decided to qualify it as harmony because I found it extremely hopeful and a harmonious approach to improve health.
 - Length: I gave this indicator a length of 0.5 because it is quite positive that the benefits of reducing patient harm are being evaluated and that the WHO considers it a critical focus of improvement. However, how much of these policies are being applied is yet to be reported on which is why the length is limited.
 - Degree: I gave this indicator a degree of 30 because I believe these policies for patient harm reduction will bring harmony, but the excitement is unclear.

¹¹WHO. (2021, August 31). “COVID-19 Response Fund.” World Health Organization Diseases: COVID-19. *World Health Organization*. Retrieved from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/donors-and-partners/funding>

¹²WHO. (2020, November 13). “WHO Establishes council on the economics of health for all.” World Health Organization News. *World Health Organization*. Retrieved from <https://www.who.int/news/item/13-11-2020-who-establishes-council-on-the-economics-of-health-for-all>

11.5.1.2 Excitement

- Indicator “US\$ 25 billion to procure and deliver a safe and effective COVID-19 vaccine to the world’s poorest countries, this could yield a benefit-to-cost ratio of 4.8 to 1. In other words, for every US\$ 1 spent, wealthier countries would get back about US\$ 4.80 in terms of the avoided economic costs.”¹³ I selected this indicator because it provides insight into the incredible potential of COVID-19 vaccine distribution in areas that currently lack access. This potential is exciting tending towards harmony.
 - Length: I gave this indicator a length of 0.8 because the potential is quite significant and hence exciting.
 - Degree: I gave this indicator a degree of 110 because it is as exciting as it is harmonious.
- Indicator “Noncommunicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally.”¹⁴ I selected this indicator because it highlights what I believe to be a huge contradiction in public health. The fact that over half of deaths are from NCDs, most of them preventable, is not only alarming but also exciting as it shows great potential for the improvement of public health. At the same time, it highlights some of the failures of the current public health policies that have not successfully tackled NCDs.
 - Length: I gave a length of 0.8 to this indicator because the statistic is quite alarming but also exciting because it shows a great margin for change.
 - Degree: I gave a degree of 10 to this indicator because I believe it is almost as close to discipline as it is to excitement, given the alarming nature of the data.
- Indicator “People who eat the most subsidized foods have a 37% higher risk of obesity.”¹⁵ I selected this indicator for similar reasons to the previous indicator. The spectacular amount of activity, money, and resources that go into food subsidies that later make people ill is an alarming contradiction and a waste of resources.
 - Length: I gave this indicator a length of 0.7 because of the huge contradiction it entails. The government is directly funding foods that later create obesity that they have to spend money on treating.

¹³WHO. (2019, September 13). “Patient Safety Fact Sheet.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/patient-safety>

¹⁴The Vaccine Alliance. (2020, November 26). “Equal, rapid access to COVID-19 vaccines won’t just save lives; it will save money.” Gavi. *The Vaccine Alliance*. <https://www.gavi.org/vaccineswork/equal-rapid-access-covid-19-vaccines-wont-just-save-lives-it-will-save-money>

¹⁵WHO. (2021, April 13). “Non-communicable diseases Fact Sheet.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>

- Degree: I gave this indicator a degree of 10 because I believe it is almost as disciplinary as it is exciting.
- Indicator “15% of hospital expenses can be attributed to treating patient safety failures in OECD countries.”¹⁶ I selected this indicator because I also found it provides extremely alarming information. The fact that the richest countries on earth still suffer from so many failures in patient safety is very confusing, concerning, and wasteful.
 - Length: I gave this indicator a length of 0.5 because it is quite a significant percentage but probably not as high as in non-OECD countries.
 - Degree: I gave this indicator a degree of 30 because it is close to discipline, but remains significantly under excitement.

11.5.1.3 Discipline

- Indicator “Global health workforce shortage is of 7.2 million health workers.”¹⁷ I selected this indicator because I wanted to bring another aspect into consideration into the eco-sphere, which is employment. I believe this indicator belongs in the discipline quality due to the loss of opportunity correlated to economic suffering and its impeding of the WHO goals overall.
 - Length: I gave this indicator a length of 0.7 because it is a significant shortage but distribution is unclear, therefore, I do not want to overestimate its length.
 - Degree: I gave this indicator a degree of 100 degrees because the shortage is detrimental to public health and an exciting opportunity for economic growth and health improvement.
- Indicator “Medical costs increased 8.2% globally for employers in 2017.”¹⁸ I selected this indicator because many economies depend in large part on how their employers, particularly small and medium-sized companies, perform. Increasing medical costs at such a high rate create a burden on such employers.
 - Length: I gave this indicator a length of 0.7 because I thought this was quite a significant increase for just one year, and it could become an unbearable burden to many employers, however, distribution remains unclear.

¹⁶Siegel, K. R. (2016, August 01). “Consumption of Subsidized Foods and Cardio metabolic Risk in US Adults.” *JAMA Internal Medicine*. *JAMA Network*. Retrieved from <https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2530901>

¹⁷WHO. (2019, September 17). “World Patient Safety Day 2019.” World Health Organization Campaigns. *World Health Organization*. Retrieved from <https://www.who.int/campaigns/world-patient-safety-day/2019>

¹⁸WHO. (2014, May 20). “Global health workforce shortage to reach 12.9 million in coming decades.” World Health Organization News. *World Health Organization*. Retrieved from <http://www.who.int/mediacentre/news/releases/2013/health-workforce-shortage/en/>

- Degree: I gave this indicator a degree of 100 because such an increase in costs seems far from balanced and harmonious, but rather a dramatic change likely to create unemployment and business failure, hence closer to the quality of excitement.
- Indicator “Cardiovascular disease costs \$126.4 billion in lost productivity annually in the US.”¹⁹ I selected this indicator because I believe it shows the lack of action to address the number one cause of death in developed countries which is easily preventable.
 - Length: I gave this indicator a length of 0.8 because of the high losses which could be saved by preventing cardiovascular disease.
 - Degree: I gave this indicator a length of 100 degrees because of the unbalance and confusion that these losses create making the indicator close to excitement.
- Indicator “COVID-19 cost women globally over \$800 billion in lost income in one year”²⁰: I selected this indicator because I believe its an insightful example of how pandemics, whether diabetes, drug abuse, or COVID affects the economy negatively. However, it is much easier to realize the true impact of such pandemics when they are sudden and with high mortality rates than when it’s a slow process over decades that becomes normalized.
 - Length: I gave this indicator a length of 0.9 because I believe it is particularly pervasive and will set income inequality back decades.
 - Degree: I gave this indicator a degree of 60 because I believe it represents discipline completely.
- Indicator “Climate change the direct damage costs to health (i.e., excluding costs in health-determining sectors such as agriculture and water and sanitation), is estimated to be between USD 2–4 billion/year by 2030.”²¹ This is perhaps one of the most important indicators I have selected because it connects all spheres under consideration. Public health policies often overlook the direct costs of environmental degradation, therefore, I found it important to include this indicator. Note that the estimate of damage costs does not include many critical sectors such as agriculture (famine), water, and sanitation (cholera and other diarrheal diseases).

¹⁹Aon plc. (2018). “2018 Global Medical Trends Report.” *Health Resources Aon*. Retrieved from http://healthresources.aon.com/global-benefits/2018-global-medical-trends-report?_ga=2.50988718.604973933.1525063962-489636635.1525063962

²⁰National Center for Chronic Disease Prevention and Health Promotion. (2017, June 28). “Chronic Disease Prevention and Health Promotion.” *Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/chronicdisease/overview/index.htm>

²¹OXFAM International. (2021, April 29). “COVID-19 cost women globally over \$800 billion in lost income in one year.” OXFAM Press Releases. OXFAM International. Retrieved from <https://www.oxfam.org/en/press-releases/covid-19-cost-women-globally-over-800-billion-lost-income-one-year#:~:text=The%20COVID%2D19%20crisis%20cost,3.9%20percent%20loss%20for%20men>.

- Length: I gave this indicator a length of 0.9 because I believe it is significantly destructive.
- Degree: I gave this indicator a degree of 60 because I believe it represents discipline completely.
- Indicator “Governments provide an average of 51% of a country’s health spending, while more than 35% of health spending per country comes from out-of-pocket expenses. One consequence of this is 100 million people are pushed into extreme poverty each year.”²² I selected this indicator because it shows the hardship many people face. They have an unbearable burden of healthcare costs which in turn has negative effects on the economy as well.
 - Length: I gave this indicator a length of 0.6 because while it is quite significant, the government still carries over 50% of the burden.
 - Degree: I gave this indicator a degree of 30 because I believe it is well into discipline but on its way to harmony due to the COVID-19 pandemic which has led decision-makers to realize the importance of universal healthcare.
- Indicator “In 2019, the proportion of funding provided by external aid dropped to less than 1% of global health expenditure. Almost half of these external funds are devoted to three diseases – HIV/AIDS, Tuberculosis (TB), and malaria.”²³ This indicator surprised me because I had the false impression that external aid for healthcare was quite significant, yet it dropped under 1% in 2019 which I find quite destructive. While these numbers probably changed during the COVID-19 health crisis, the question remains as to the future level of expenditure in public healthcare and external aid in the post-COVID world.
 - Length: I gave this indicator a length of 0.7 because this is an alarming trend, but perhaps not the trend anymore. The length is likely to change soon and significantly.
 - Degree: I gave this indicator a degree of 60 because I believe it very well represents the discipline quality.

²²WHO. (2018, February 1). “Climate Change and Health Fact Sheet.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

²³WHO. (2018, February 1). “Climate Change and Health Fact Sheet.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

11.5.2 *Socio-Sphere*

11.5.2.1 **Harmony**

- Indicator “Globally, life expectancy has increased by more than 6 years between 2000 and 2019 – from 66.8 years in 2000 to 73.4 years in 2019.”²⁴ I selected this indicator because life expectancy is one of the best indicators of health, although not it is not perfect and it might be misleading. As with any global data, it hides the existing inequalities between countries. Moreover, life expectancy accounts for expectancy at birth which may change in the face of unforeseen events.
 - Length: I gave this indicator a length of 0.8 because life expectancy has increased quite significantly in a short period however, it is not a 10 because it could have increased more if we acted more firmly against ongoing preventable health issues such as obesity and air pollution.
 - Degree: I gave this indicator a degree of 30 degrees because this increase in life span is harmonious and leading to excitement for humanity. It is not closer because of the potential challenging results of this population increase for the quality of life of many people, especially in developing regions which struggle to provide services to the growing population.
- Indicator “New HIV infections have been reduced by 47% since the peak in 1998.”²⁵ I selected this indicator because HIV has been one of the most pressing issues in public health for the last few decades, and it has proven especially difficult to address because of the social stigma associated with the condition.
 - Length: I gave this indicator a length of 0.5 because although it is positive and harmonious that HIV infections are decreasing, it appears to be a quite small decrease for such a long period, especially since it is a main focus of WHO policies and programmes.
 - Degree: I gave this indicator a degree of 30 because the fight against HIV has brought a lot of constructive and positive breakthroughs to the affected communities, but it has also required a lot of action and organizing.
- Indicator “One of the largest declines in the number of deaths is from diarrheal diseases, with global deaths falling from 2.6 million in 2000 to 1.5 million in

²⁴WHO. (2018, February 1). “Climate Change and Health Fact Sheet.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

²⁵WHO. (2006–2019). “GHE: Life expectancy and healthy life expectancy.” Global Health Observatory. *World Health Organization*. Retrieved from <https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-life-expectancy-and-healthy-life-expectancy>

2019.”^{26,27} I selected this indicator because diarrheal diseases are one of the main causes of death in the world while also being one of the most preventable ones as it is related to water quality. It shows our potential to improve public health.

- Length: I gave this indicator a length of 0.7 because this is an impressive decrease but not a very impressive decrease for a 10 year time period, especially if we consider how preventable these diseases are. The fact is that diarrheal diseases are still the leading cause of death in children. It is preventable by simply providing clean water.²⁸
- Degree: I gave this indicator a degree of 60 degrees because it indicates growing harmony with our surroundings.
- Indicator “In the period 2010–2019, total malaria cases in the 21 E-2020 countries was reduced by 79%.”²⁹ I selected this indicator because Malaria is also one of the biggest focuses and challenges of the WHO. The E-2020 countries are 21 countries, including South Africa, Mexico, and China, selected for Malaria elimination programmes by the WHO with quite encouraging results
 - Length: I gave this indicator a length of 0.8 because of the quite significant progress.
 - Degree: I gave this indicator a degree of 30 because of the exciting potential of this programme when applied worldwide.
- Indicator “COVAX offers Doses for at least 20% of countries’ populations.”³⁰ COVAX is a WHO pro-vaccination initiative aiming for equal vaccine distribution. I selected this indicator because it aims to reach harmony between countries.
 - Length: I gave this indicator a length of 0.5 because while 20% is significant, it falls short of what we need to overcome the COVID-19 pandemic.
 - Degree: I gave this indicator a degree of 100 because while it remains in harmony, with current vaccination inequalities and protective patent policies it seems like COVAX’s efforts might not be enough.

²⁶UN AIDS. (1990–2021) “Global HIV & AIDS statistics Fact sheet.” United Nations AIDS Press Center. *United Nations*. Retrieved From <https://www.unaids.org/en/resources/fact-sheet>

²⁷WHO. (2020, December 9). “The top 10 causes of death.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>

²⁸UNICEF. (2021, April). “Diarrhoea remains a leading killer of young children, despite the availability of a simple treatment solution.” United Nations Children’s Fund: Diarrheal Disease. *UNICEF*. Retrieved from <https://data.unicef.org/topic/child-health/diarrhoeal-disease/>

²⁹PAHO. (2021, April 21). “World Malaria Day: WHO launches effort to stamp out malaria in 25 more countries by 2025.” Pan American Health Organization News. *World Health Organization*. Retrieved from <https://www.paho.org/en/news/21-4-2021-world-malaria-day-who-launches-effort-stamp-out-malaria-25-more-countries-2025>

³⁰COVAX. (2021) “Working for global equitable access to COVID-19 vaccines.” World Health Organization: COVAX. *CEPI, Gavi and WHO*. Retrieved from <https://www.who.int/initiatives/accelerator/covax>

- Indicator “G7 announces pledges of 870 million COVID-19 vaccine doses, of which at least half to be delivered by the end of 2021.”³¹ This indicator incites similar reactions to the previous one as they are both pledges yet to be fulfilled. However, they show a pattern of developed countries and international organizations setting unsubstantiated goals.
 - Length: I gave this indicator a length of 0.5 because while 870 million is significant, it also falls short of what we need to overcome the COVID-19 pandemic.
 - Degree: I gave this indicator a degree of 100 because while it remains in harmony, with current vaccination inequalities and protective patent policies it seems like the G7 efforts will not be enough.

11.5.2.2 Excitement

- Indicator “Number of plastic surgery procedures increased 6.7% from 2018 to 2019.”³² I selected this indicator because it shows the magnitude of the relatively new phenomenon which is plastic surgery. A small percentage of plastic surgery is for correcting really disfiguring features. However, the great majority is merely to “enhance” beauty. While at least half of the world’s population does not have access to basic healthcare, others have surgery by choice. It is quite a contrast that shows the contradictions of the industrialized world.
 - Length: I gave this indicator a length of 0.7 because of the novelty and extravagance of the indicator.
 - Degree: I gave this indicator a degree of 60 degrees because I do not want to characterize plastic surgery as constructive or destructive, but rather an interesting pattern to observe that might provide us with information about society.
- Indicator “One-quarter of all deaths from heart disease and stroke are preventable.”³³ I found this indicator while searching for the most common causes of death and WHO programmes to decrease them. I was shocked to find that there are little, to no, international programmes to prevent these conditions.
 - Length: I gave this indicator a length of 0.8 because of its severity.
 - Degree: I gave this indicator a degree of 10 degrees because I believe it is almost as destructive as it is contradictory.

³¹WHO. (2021, June 13) “G7 announces pledges of 870 million COVID-19 vaccine doses, of which at least half to be delivered by the end of 2021.” World Health Organization News. *World Health Organization*. Retrieved from <https://www.who.int/news/item/13-06-2021-g7-announces-pledges-of-870-million-covid-19-vaccine-doses-of-which-at-least-half-to-be-delivered-by-the-end-of-2021>

³²ISAPS. (2019). “ISAPS Global Statistics.” *International Society of Aesthetic Plastic Surgery*. Retrieved from <https://www.isaps.org/medical-professionals/isaps-global-statistics/>

³³LeWine, H., MD. (2013, September 04). “200,000 heart disease, stroke deaths a year are preventable.” Harvard Health. *Harvard University*. Retrieved from <https://www.health.harvard.edu/blog/200000-heart-disease-stroke-deaths-a-year-are-preventable-201309046648>

- Indicator “Reduction of Polio infections: Since 1998 there has been a 99.9% reduction in annual cases of polio.”³⁴ This indicator is quite opposite of the last indicator. Polio has now been nearly eradicated, unlike heart disease, as a result of global efforts by the WHO, Rotary International, UNICEF, etc. These coordinated campaigns have been extremely successful and have required incredible amounts of work. The efforts have been rewarded by spectacular results.
 - Length: I gave this indicator a length of 0.9 because of how spectacular the drop has been.
 - Degree: I gave this indicator a degree of 110 because while it is very exciting, it has also brought a lot of wellness and balance.
- Indicator “One in 100 deaths is by suicide.”³⁵ I included this indicator because I wanted to look at health holistically, including mental health which is often ignored. What I found stunned me. Suicide is most common in younger adults with victims being overwhelmingly male.
 - Length: I gave this indicator a length of 0.7 because of the severity of the statistic.
 - Degree: I gave this indicator a degree of 10 because it is as destructive as it is shocking.
- Indicator “While healthy life expectancy (HALE) has also increased by 8% from 58.3 in 2000 to 63.7, in 2019, this was due to declining mortality rather than reduced years lived with disability. In other words, the increase in HALE (5.4 years) has not kept pace with the increase in life expectancy (6.6 years).”³⁶ I included this indicator because it provided depth to the previous indicator in life expectancy and added robustness to the research. Life expectancy has increased quite a bit, but the years lived with disabilities have not decreased at the same rate, which means public health policies have been mostly focused on reducing mortality rather than increasing wellness.
 - Length: I gave this indicator a length of 0.5 because the indicator shows a somewhat significant contradiction in public health policy.
 - Degree: I gave this indicator a degree of 20 because it shows a lack of policies promoting quality of life – maybe because this is difficult to measure or to take into account.

³⁴WHO (2017). “Global Polio Eradication Initiative: Semi-annual Status Report January – June 2017.” WHO’s Progress against the polio Eradication & Endgame Strategic Plan. *World Health Organization*. Retrieved from <http://polioeradication.org/wp-content/uploads/2017/12/WHO-Polio-Donor-Report-january-june-2017-web-30112017.pdf>

³⁵WHO. (2021, June 17). “One in 100 deaths is by suicide.” *World Health Organization News*. *World Health Organization*. Retrieved from <https://www.who.int/news/item/17-06-2021-one-in-100-deaths-is-by-suicide>

³⁶WHO. (1990–2019). “GHE: Life expectancy and healthy life expectancy.” *Global Health Observatory*. *World Health Organization*. Retrieved from <https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-life-expectancy-and-healthy-life-expectancy>

- Indicator “1.9 billion Adults are overweight or obese, while 462 million are underweight.”³⁷ This indicator again brings up the contradictions of public health. While some populations are overweight others are underweight, highlighting how many of these health issues are not a matter of lack of resources, but rather a distribution of both.
 - Length: I gave this indicator a length of 0.7 because of the significant disparity.
 - Degree: I gave this indicator a length of 60 because I will later qualify other similar indicators as destructive and I would like to highlight the contradictory nature of this data.

11.5.2.3 Discipline

- Indicator “Number of people without access to essential health services: At least half of the world’s population cannot obtain essential health services.”³⁸ I selected this indicator because I thought it captures the gravity of the healthcare challenge: it is 2021 and at least half of the world’s population cannot obtain healthcare services. I believe this is a robust indicator of major importance to the compass.
 - Length: I gave this indicator a length of 9 because it is politically suppressive and destructive. One may argue that it is a long length considering that the other half does have access to essential healthcare, but I think that still, the gravity is too high for a shorter length.
 - Degree: I gave this indicator a degree of 100 degrees because of how spectacular the data is while being extremely unbalanced at the same time, therefore the degree leans towards excitement much more than to harmony.
- Indicator “Assuming continued economic growth and health progress, [it was] concluded that climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050; 38,000 due to heat exposure in elderly people, 48,000 due to diarrhoea, 60,000 due to malaria, and 95,000 due to childhood undernutrition.”³⁹ This indicator complements the Climate Change indicator in the econo-sphere and provides specific data on deaths. However, recent data shows already 150,000 people die each year directly from climate change so the datum might be underestimated.⁴⁰ Moreover, climate change is

³⁷WHO. (2021, June 9) “Malnutrition Factsheet.” World Health Organization News. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/malnutrition>

³⁸WHO. (2018, March 23). “Tracking universal health coverage: 2017.” Global Monitoring Report. *World Health Organization*. Retrieved from http://www.who.int/healthinfo/universal_health_coverage/report/2017/en/

³⁹SOGA. (2017). “A Special Report on Global Exposure to Air Pollution and its Disease Burden.” *State of Global Air & Health Effects Institute*. Retrieved from https://www.stateofglobalair.org/sites/default/files/SOGA2017_report.pdf

⁴⁰WHO. (2021). “Deaths from Climate Change. “Health and Environment Linkages Initiative. *World Health Organization*. Retrieved From <https://www.who.int/heli/risks/climate/climatechange/en/>

more of a threat multiplier than a cause of death itself, so the deaths caused by floods, typhoons, etc. might not be considered to be directly linked to climate change but are precipitated by such.

- Length: I gave this indicator a length of 0.8 because of the destructive characteristics of the indicator.
- Degree: I gave this indicator a length of 60 because it is purely disciplinary.
- Indicator “Over 90% of the world’s population lived in areas with unhealthy air in 2015.”⁴¹ I selected this indicator because it demonstrates the magnitude of the impact humans have in the environment which in turn affects society overall. Air pollution is a common externality of industrial processes and transportation, but it contributes greatly to strokes, cardiovascular disease, respiratory diseases, etc. Something to take into consideration, however, is that most people nowadays live in urban areas which tend to have the worst air quality, rather than the air being polluted equally across the globe.
 - Length: I gave this indicator a length of 0.9 because it is extremely destructive to human health.
 - Degree: I gave this indicator a degree of 60 degrees because it is purely disciplinary.
- Indicator “Worldwide obesity has nearly tripled since 1975.”⁴² I selected this indicator because obesity is a relatively new issue (at least at this scale) which contributes greatly to the new health challenges of developed nations such as diabetes. It is a global trend that has been observed over a few years which adds to the robustness of the indicator.
 - Length: I gave this indicator a length of 0.9 because the consequences of obesity at this scale are devastating, especially if we consider that most cases are preventable.
 - Degree: I gave this indicator a degree of 100 degrees due to the novelty of the epidemic of obesity.
- Indicator “Diabetes has entered the top 10 causes of death, following a significant percentage increase of 70% since 2000. Diabetes is also responsible for the largest rise in male deaths among the top 10, with an 80% increase since 2000.”⁴³ Similar to the last indicator, the rise of diabetes is linked to western-style development

⁴¹ WHO. (2021, June 21). “Chronic Obstructive Pulmonary Disease Factsheet.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-copd>

⁴² WHO. (2018, February 09). “Obesity and overweight.” World Health Organization News. *World Health Organization*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/>

⁴³ WHO. (2020, December 9). “The top 10 causes of death.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>

and is highly preventable. Diabetes not only can cause death but it can greatly affect quality of life if not properly handled.

- Length: I gave this indicator a length of 0.8 because of the high rate of deaths.
 - Degree: I gave this indicator a degree of 100 due to the novelty of the epidemic of diabetes.
- Indicator “The world’s biggest killer is ischemic heart disease, responsible for 16% of the world’s total deaths. Since 2000, the largest increase in deaths has been due to this disease, rising by more than 2 million to 8.9 million deaths in 2019.”⁴⁴ Earlier we saw that one-third of deaths by heart disease and stroke are preventable. Now we look more narrowly at ischemic heart disease is the cause of 16% of the world’s deaths.
 - Length: I gave this indicator a length of 0.8 because of the magnitude of the death toll.
 - Degree: I gave this indicator a degree of 60 because I believe it is purely destructive and shows the lack of focus on preventative medicine.
 - Indicator “Worldwide, 3 million deaths every year result from harmful use of alcohol, this represents 5.3 % of all deaths.”⁴⁵ I included this indicator because I wanted to add more aspects to the idea of health. Drug abuse, including alcohol, is a real epidemic in many countries including the US and Russia, yet I was surprised to find that alcohol use alone is responsible for 5.3% of all deaths. I believe these deaths are the result of unaddressed mental health issues hence the reason I qualified it as discipline.
 - Length: I gave this indicator a length of 0.9 because the death toll is incredibly high.
 - Degree: I gave this indicator a degree of 60 because of the destructive nature of the indicator.

11.5.3 *Eco-Sphere*

11.5.3.1 **Harmony**

- Indicator “Record-breaking 2020 Antarctic ozone hole finally closed at the end of December.”⁴⁶ I selected this indicator because the loss of the Ozone layer is an

⁴⁴WHO. (2020, December 9). “The top 10 causes of death.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>

⁴⁵WHO. (2021, September 21). “Alcohol.” World Health Organization Newsroom. *World Health Organization*. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/alcohol>

⁴⁶WMO. (2021, January 6). “Record-breaking 2020 ozone hole closes.” World Meteorological Organization News. *World Meteorological Organization*. Retrieved from <https://public.wmo.int/en/media/news/record-breaking-2020-ozone-hole-closes>

environmental issue caused by human activity that affects not only ecosystem health worldwide but also human health directly. However, it has also been one of the issues most effectively addressed by the international community and it is often used as an example of international cooperation for environmental action from which to draw inspiration for other issues such as climate change. I thought it would be important to represent such efforts in the compass.

- Length: I gave this indicator a length of 0.9 because this indicator was very positive and constructive.
 - Degree: I gave this indicator a degree of 60 degrees because finally harmony has been restored to the Ozone Layer.
- Indicator “China wildlife crime prosecutions [went] up sharply after COVID-19 outbreak. China prosecuted more than 15,000 people for wildlife-related crimes in the first nine months of the year, up 66% from 2019.⁴⁷ I selected this indicator because it shows a shift in Chinese policy to live in harmony with its wildlife in order to avoid zoonotic diseases such as COVID-19. It is a quite exciting change that brings hope to NGOs fighting for wildlife and biodiversity conservation around the globe.
 - Length: I gave this indicator a length of 0.7 because of the fast and encouraging change.
 - Degree: I gave this indicator a degree of 10 because while this indicator brings harmony to the ecosphere, it is also incredibly exciting and it entails a lot of renewed action against wildlife trafficking.
- Indicator “Marine ecosystem resilience has been observed by 80% of the surveyed experts on all ecosystems.”⁴⁸ I selected this indicator because I believe it adds to the discussion around the complexity of health. Human health is intrinsically linked to biodiversity and marine ecosystems. This indicator demonstrates the resilience of species within ecosystems and their ability to find harmony, the fact that 80% of the experts saw resilience on all ecosystems of the most major marine biodiversity hotspots studied means that they saw these ecosystems under stress due to human activities. The level of such resilience varies among and within ecosystems, moreover, elements of the ecosystem may be becoming more resilient while others might be disappearing completely.
 - Length: I gave this indicator a length of 0.5 because while it is positive that ecosystems are showing some level of resilience to environmental pressure, the complexity of the indicator shows limited harmony.

⁴⁷Stanway, D. (2020, November 9). “China wildlife crime prosecutions up sharply after COVID-19 outbreak.” Reuters Environment. *Reuters*. Retrieved from <https://www.reuters.com/article/us-china-environment-wildlife-idUSKBN27P35B>

⁴⁸O’Leary, J. K., Micheli, F., Airoldi, L., Boch, C., De Leo, G., Elahi, R., Wong, J. (2017, February 1). “Resilience of Marine Ecosystems to Climatic Disturbances.” Oxford Academic: *BioScience*. *Oxford University*. Retrieved from <https://academic.oup.com/bioscience/article/67/3/208/2900174>

- Degree: I gave this indicator a degree of 100 degrees because while I believe the indicator is positive in that ecosystems are adapting, the fact that they are under pressure to adapt is quite disciplinary.
- Indicator “4 billion people rely primarily on natural medicines.”⁴⁹ I selected this indicator because it shows our dependency health-wise on nature and how on some level we are still in harmony with it.
 - Length: I gave this indicator a length of 0.8 because the statistic encompasses over half of the world’s population which is quite significant.
 - Degree: I gave this indicator a degree of 60 because the indicator is a great example of living in harmony with nature.

11.5.3.2 Excitement

- Indicator “The Food and Agriculture Organization of the United Nations reports that 800 million people worldwide grow vegetables or fruits or raise animals in cities, producing an astonishing 15 to 20 percent of the world’s food.”⁵⁰ This indicator was quite shocking and confusing to find. I could not help but wonder how all this agricultural activity is taking place in cities and whether it is happening chaotically in slums or harmoniously in city gardens which is why I classified it under excitement.
 - Length: I gave this indicator a length of 0.7 because the statistic quite significant.
 - Degree: I gave this indicator a degree of 110 because it also has a strong harmony aspect a well in terms of maintaining our relationship with nature.
- Indicator “Thirty percent of the drugs sold worldwide contain compounds derived from plant material.”⁵¹ This indicator complements the previous indicator about medicine. It also shows our intrinsic relationship with the environment and the level of extraction we derive from it.
 - Length: I gave this indicator a length of 0.5 because the percentage is significant but could be greater.
 - Degree: I gave this indicator a degree of 110 because it also has a strong harmony aspect a well in terms of maintaining our relationship with nature.

⁴⁹UN. (2019, May 6). “UN Report: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’” United Nations Blog. *United Nations*. Retrieved from <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

⁵⁰Royte, E. (2015, May 5) “Urban farms now produce 1/5 of the world’s food.” GreenBiz and Food & Environment Reporting Network. *GreenBiz*. Retrieved from. <https://www.greenbiz.com/article/urban-farms-now-produce-15-worlds-food>

⁵¹FAO. (2020) “Trade in Medicinal Plants.” Economic and Social Department Food and Agriculture Organization of the United Nations. United Nations. Retrieved from <http://www.fao.org/3/af285e/af285e00.pdf>

- Indicator “Plants have globally increased their water use efficiency at the leaf level in proportion to the rise in atmospheric CO₂.”⁵² I selected this indicator because it demonstrates the unpredictable response of ecosystems to human impacts. The phenomenon is new and it has yet to be understood, therefore, one could argue that this indicator lacks robustness. However, I believe it is important to represent the high level of uncertainty that ecosystem health entails.
 - Length: I gave this indicator a length of 0.6 because this is a relatively new phenomenon but it is poorly understood, therefore, I did not feel it was strong enough for a longer length.
 - Degree: I gave this indicator a length of 20 degrees because it is so uncertain that it is hard to predict if the effects will be harmonious or disciplinary. Water efficiency sounds like could bring benefits to ecosystems dealing with increasing drought due to climate change, but typically a change, as subtle as might be, can create enormous unforeseen consequences.
- Indicator “On average, the researchers found 20 microplastic particles per 10g of stool.”⁵³ Discoveries around the prevalence of microplastics new and alarming. We do not understand yet the consequences of these microplastics and research is ongoing which is why I classified this indicator under excitement.
 - Length: I gave this indicator a length of 0.8 because the statistic is quite significant.
 - Degree: I gave this indicator a degree of 10 because it demonstrates the level of impact we are having on the environment rather than living in harmony with it.

11.5.3.3 Discipline

- Indicator “In the US in 2013, the health care sector was also responsible for acid rain (12%), greenhouse gas emissions (10%), smog formation (10%) criteria air pollutants (9%), stratospheric ozone depletion (1%), and carcinogenic and non-carcinogenic air toxics (1–2%).”⁵⁴ I specifically searched for this indicator because I had analyzed the role of air pollution in other indicators, so I wanted to include the role of healthcare itself in air pollution which is quite staggering. A weakness of this indicator is that although it is quite specific, it is limited to the US.

⁵²Keeling, R. F., Graven, H. D., Welp, L. R., Resplandy, L., Bi, J., Piper, S. C., Meijer, H. A. (2017, September 26). “Atmospheric evidence for a global secular increase in carbon isotopic discrimination of land photosynthesis.” *Proceedings of the National Academy of Sciences of the United States of America*. Retrieved from <http://www.pnas.org/content/114/39/10361>

⁵³Paskins, L. (2018, October 2022). “Microplastics discovered in human stools across the globe in ‘first study of its kind’” *EurekaAlert*. Retrieved from https://www.eurekaalert.org/pub_releases/2018-10/sh-mdi101518.php

⁵⁴Eckelman, M. J., & Sherman, J. (2016, June 9). “Environmental Impacts of the U.S. Health Care System and Effects on Public Health.” *PLOS ONE*. Retrieved from <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0157014>

- Length: I gave this indicator a length of .5 because it is quite an important contribution to air pollution but it is not close to being the main or a large contributor.
- Degree: I gave this indicator a degree of 100 degrees because of the novelty of these contributions.
- Indicator “Severe pathogen pollution is estimated to affect around a quarter of Latin American river stretches, around 10 to 25% of African river stretches and about a third to one-half of Asian river stretches.”^{55,56} I selected this indicator because it deals specifically with faecal pathogen pollution, which could be prevented with proper sanitation and sewage management, yet it is not. It is a concrete example that provides depth to previous indicators about diarrheal diseases.
 - Length: I gave this indicator a length of .8 because of the tremendous harm that derives from water pollution, and the prevalence of such pollution in streams in these three regions.
 - Degree: I gave this indicator a degree of 60 degrees because of the lack of tendency either towards excitement or harmony.
 - Indicator “Particulate Matter concentrations increased by 11.2% from 1990 to 2015 worldwide.”¹ Particulate matter is a type of air pollution made of organic material small enough to travel through the main respiratory tracks to then get stuck on the lung tissue and even sometimes penetrate the bloodstream causing all sorts of respiratory and other health issues. This indicator also adds depth to other indicators about air quality and demonstrates how it is a worsening issue.
 - Length: I gave this indicator a length of 0.7 because of the significant worsening of just one type of air pollutant.
 - Degree: I gave this indicator a degree of 60 because the indicator shows a lack of policies and actions to address increasing air pollution.
- Indicator: Soil degradation has reduced the productivity of 23% of the global land surface.⁵⁷ Productive and healthy soil is fundamental for human health. I selected this indicator because the loss of productive soil is destructive and indirectly impacts human health because it reduces the nutrition in food. The amount of vitamin C in a typical apple in the 1950s was 80% higher than it is today.

⁵⁵UNEP. (2016). “A Snapshot of the World’s Water Quality: Towards a global assessment.” *United Nations Environmental Programme*. Retrieved from https://uneplive.unep.org/media/docs/assessments/unep_wwqa_report_web.pdf

⁵⁶SOGA. (2017). “A Special Report on Global Exposure to Air Pollution and its Disease Burden.” *State of Global Air & Health Effects Institute*. Retrieved from https://www.stateofglobalair.org/sites/default/files/SOGA2017_report.pdf

⁵⁷UN. (2019, May 6). “UN Report: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’” *United Nations Blog*. *United Nations*. Retrieved from <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

- Length: I gave this indicator a length of 0.7 because of the severity of the destruction.
- Degree: I gave this indicator a degree of 60 because it is purely disciplinary.
- Indicator “75%: terrestrial environment “severely altered” to date by human actions (marine environments 66%)”⁵⁸ This indicator complements the previous indicator on land productivity degradation. Not only has 23% of land lost its productivity but 75% of terrestrial ecosystems have been severely altered, which demonstrates the level of environmental disruption due to human activity.
 - Length: I gave this indicator a length of 0.8 because of the severity of the indicator.
 - Degree: I gave this indicator a degree of 60 because it is purely disciplinary.
- Indicator “85% of wetlands present in 1700 had been lost by 2000 – loss of wetlands is currently three times faster, in percentage terms than forest loss.”⁵⁹ Wetlands are critical areas of biodiversity, water purification, and storm mitigation. They are very vulnerable to human activity and very important for ecosystem and human health. Their destruction is a direct threat to human life which is why I decided to include this indicator.
 - Length: I gave this indicator a length of 0.9 because most wetlands have been lost.
 - Degree: I gave this indicator a degree of 60 because it is purely disciplinary.
- Indicator “Ocean acidification increased by 30% since Industrial Revolution.”⁶⁰ Ocean acidification is due to increasing CO₂ concentrations in the ocean. It is a direct threat to food security and, therefore, to the health of millions of people around the world. Ocean acidification is often overlooked as a side effect of climate change which is why I selected this indicator.
 - Length: I gave the indicator a length of 0.8 because of the gravity of the increase.
 - Degree: I gave this indicator a degree of 60 because it is purely disciplinary.

⁵⁸UN. (2019, May 6). “UN Report: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’” United Nations Blog. *United Nations*. Retrieved from <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

⁵⁹UN. (2019, May 6). “UN Report: Nature’s Dangerous Decline ‘Unprecedented’; Species Extinction Rates ‘Accelerating’” United Nations Blog. *United Nations*. Retrieved from <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

⁶⁰NOAA. (2021) “A primer on Ph.” Pacific Marine Environmental Laboratory: Carbon Program. *National Oceanic and Atmospheric Administration*. Retrieved from <https://pmel.noaa.gov/co2/story/A+primer+on+pH>

11.6 Indicator Table 11.1

Table 11.1 WHO Table

Sphere	Quality	Indicator	Degree	Length
Econo-sphere	Harmony	WHO Budget in 2020–2021, 4,840.4 million US Dollars, 11% increase compared to 2018–2019.	10	0.7
Econo-sphere	Harmony	Savings in productivity losses from vaccination rates: Rates of vaccination against pneumococcal, Haemophilus influenza type b pneumonia and meningitis, rotavirus, pertussis, measles, and malaria over the next 10 years will save \$145 billion in productivity losses.	10	0.5
Econo-sphere	Harmony	Investments in expanding Universal Health Coverage over the next 5 years will result in 24.4 million lives saved. Each dollar invested will result in a return of US\$ 1.40.	30	0.8
Econo-sphere	Harmony	Donations to WHO to fight COVID 608,516,234 US Dollars.	20	0.8
Econo-sphere	Harmony	WHO establishes Council on the Economics of Health for All The Council, comprising top economists and health experts, will focus on investments in health, and achieving sustainable, inclusive and innovation-led economic growth.	10	0.3
Econo-sphere	Harmony	Investments in reducing patient harm can lead to significant financial savings, and more importantly better patient outcomes (2). An example of prevention is engaging patients, if done well, it can reduce the burden of harm by up to 15%.	30	0.5
Econo-sphere	Excitement	US\$ 25 billion to procure and deliver a safe and effective COVID-19 vaccine to the world's poorest countries, this could yield a benefit-to-cost ratio of 4.8 to 1. In other words, for every US\$ 1 spent, wealthier countries would get back about US\$ 4.80 in terms of the avoided economic costs.	110	0.8
Econo-sphere	Excitement	Noncommunicable diseases (ncds) kill 41 million people each year, equivalent to 71% of all deaths globally.	10	0.8
Econo-sphere	Excitement	Relation between subsidized foods and obesity: People who eat the most subsidized foods have a 37% higher risk of obesity.	10	0.7
Econo-sphere	Excitement	15% of hospital expenses can be attributed to treating patient safety failures in OECD countries.	30	0.5
Econo-sphere	Discipline	Global health workforce shortage: Global health workforce shortage is of 7.2 million health workers.	100	0.7

(continued)

Table 11.1 (continued)

Sphere	Quality	Indicator	Degree	Length
Econo-sphere	Discipline	Increase of medical costs: Medical costs increased 8.2% globally for employers in 2017.	100	0.7
Econo-sphere	Discipline	Cost of productivity losses of cardiovascular disease: Cardiovascular disease costs \$126.4 billion in lost productivity annually in the US.	100	0.8
Econo-sphere	Discipline	COVID-19 cost women globally over \$800 billion in lost income in 1 year.	60	0.9
Econo-sphere	Discipline	Climate change the direct damage costs to health (i.e. Excluding costs in health-determining sectors such as agriculture and water and sanitation), is estimated to be between used 2–4 billion/year by 2030.	60	0.9
Econo-sphere	Discipline	Governments provide an average of 51% of a country's health spending, while more than 35% of health spending per country comes from out-of-pocket expenses. One consequence of this is 100 million people pushed into extreme poverty each year.	30	0.6
Econo-sphere	Discipline	The proportion of funding provided by external aid has dropped to less than 1% of global health expenditure. Almost half of these external funds are devoted to three diseases – HIV/AIDS, Tuberculosis (TB) and malaria.	60	0.7
Socio-sphere	Harmony	Globally, life expectancy has increased by more than 6 years between 2000 and 2019 – from 66.8 years in 2000 to 73.4 years in 2019.	30	0.8
Socio-sphere	Harmony	New HIV infections have been reduced by 47% since the peak in 1998.	30	0.5
Socio-sphere	Harmony	One of the largest declines in the number of deaths is from diarrheal diseases, with global deaths falling from 2.6 million in 2000 to 1.5 million in 2019.	60	0.7
Socio-sphere	Harmony	In the period 2010–2019, total malaria cases in the 21 E-2020 countries reduced by 79%.	30	0.8
Socio-sphere	Harmony	COVAX offers Doses for at least 20% of countries' populations.	100	0.5
Socio-sphere	Harmony	G7 announces pledges of 870 million COVID-19 vaccine doses, of which at least half to be delivered by the end of 2021.	100	0.5
Socio-sphere	Excitement	Number of plastic surgery procedures increased 6.7% from 2018 to 2019.	60	0.7
Socio-sphere	Excitement	Preventability of deaths by stroke and heart disease: One-quarter of all deaths from heart disease and stroke are preventable.	10	0.8
Socio-sphere	Excitement	Reduction of Polio infections: Since 1998 there has been a 99.9% reduction in annual cases of polio.	110	0.9
Socio-sphere	Excitement	One in 100 deaths is by suicide.	10	0.7

(continued)

Table 11.1 (continued)

Sphere	Quality	Indicator	Degree	Length
Socio-sphere	Excitement	While healthy life expectancy (HALE) has also increased by 8% from 58.3 in 2000 to 63.7, in 2019, this was due to declining mortality rather than reduced years lived with disability. In other words, the increase in HALE (5.4 years) has not kept pace with the increase in life expectancy (6.6 years).	20	0.5
Socio-sphere	Excitement	1.9 billion Adults are overweight or obese, while 462 million are underweight.	60	0.7
Socio-sphere	Discipline	Number of people without access to essential health services: At least half of the world's population cannot obtain essential health services.	100	0.9
Socio-sphere	Discipline	Assuming continued economic growth and health progress, concluded that climate change is expected to cause approximately 250,000 additional deaths per year between 2030 and 2050; 38,000 due to heat exposure in elderly people 48,000 due to diarrhea, 60,000 due to malaria, and 95,000 due to childhood undernutrition.	60	0.8
Socio-sphere	Discipline	Percentage of people living in areas with unhealthy air: Over 90% of the world's population lived in areas with unhealthy air in 2015. Chronic Obstructive Pulmonary Disease (COPD) is the third leading cause of death worldwide, causing 3.23 million deaths in 2019.	60	0.9
Socio-sphere	Discipline	Worldwide obesity rate: Worldwide obesity has nearly tripled since 1975.	100	0.9
Socio-sphere	Discipline	Diabetes has entered the top 10 causes of death, following a significant percentage increase of 70% since 2000. Diabetes is also responsible for the largest rise in male deaths among the top 10, with an 80% increase since 2000.	100	0.8
Socio-sphere	Discipline	The world's biggest killer is ischemic heart disease, responsible for 16% of the world's total deaths. Since 2000, the largest increase in deaths has been for this disease, rising by more than 2 million to 8.9 million deaths in 2019.	60	0.8
Socio-sphere	Discipline	Worldwide, 3 million deaths every year result from harmful use of alcohol, this represent 5.3 % of all deaths.	60	0.9
Eco-sphere	Harmony	Record-breaking 2020 Antarctic ozone hole finally closed at the end of December.	60	0.9
Eco-sphere	Harmony	China wildlife crime prosecutions up sharply after COVID-19 outbreak. China prosecuted more than 15,000 people for wildlife-related crimes in the first nine months of the year, up 66% from 2019.	10	0.7

(continued)

Table 11.1 (continued)

Sphere	Quality	Indicator	Degree	Length
Eco-sphere	Harmony	Marine ecosystem resilience as observed by experts: 80% of experts observed resilience in all ecosystem types.	100	0.5
Eco-sphere	Harmony	4 billion: people who rely primarily on natural medicines.	60	0.8
Eco-sphere	Excitement	The Food and Agriculture Organization of the United Nations reports that 800 million people worldwide grow vegetables or fruits or raise animals in cities, producing an astonishing 15–20% of the world's food.	110	0.7
Eco-sphere	Excitement	Thirty percent of the drugs sold worldwide contain compounds derived from plant material.	110	0.5
Eco-sphere	Excitement	Plants have globally increased their water use efficiency at the leaf level in proportion to the rise in atmospheric CO ₂ .	20	0.6
Eco-sphere	Excitement	On average, the researchers found 20 microplastic particles per 10 g of stool.	10	0.8
Eco-sphere	Discipline	Contribution of the healthcare sector to air pollution: In 2013, the healthcare sector was also responsible for acid rain (12%), greenhouse gas emissions (10%), smog formation (10%) criteria air pollutants (9%), stratospheric ozone depletion (1%), and carcinogenic and non-carcinogenic air toxics (1–2%).	100	0.5
Eco-sphere	Discipline	Prevalence of pathogen pollution in streams in different world regions: Severe pathogen pollution is estimated to affect around a quarter of Latin American river stretches, around 10–25% of African river stretches and about a third to one-half of Asian river stretches.	60	0.8
Eco-sphere	Discipline	Increase in particulate matter pollution: Particulate Matter concentrations increased by 11.2% from 1990 to 2015.	60	0.7
Eco-sphere	Discipline	Land degradation has reduced the productivity of 23% of the global land surface.	60	0.7
Eco-sphere	Discipline	75%: terrestrial environment “severely altered” to date by human actions (marine environments 66%).	60	0.8
Eco-sphere	Discipline	85%: of wetlands present in 1700 had been lost by 2000 – loss of wetlands is currently three times faster, in percentage terms, than forest loss.	60	0.9
Eco-sphere	Discipline	Ocean acidification increased 30% since Industrial Revolution.	60	0.8

Note that references for the data were given in Sect. 11.5

11.7 Compass Results

Following the methodology by Dr. Friend thoroughly explained in previous chapters, indicators were aggregated and calibrated with the resulting compasses. We find several types of compasses. First, two compasses per sphere, one reflecting the aggregated indicators per quality (Figs. 11.1, 11.3, and 11.5) and one with all the indicators and qualities aggregated with one final arrow (Figs. 11.2, 11.4, and 11.6). Figure 11.1 depicts the three quality arrows for the econo-sphere, with the arrows of harmony and discipline being longer but angled towards excitement. The final aggregated arrow of the econo-sphere can be found in figure two, in the excitement quality, leaning towards discipline. What these compasses tell us is that there is a great deal of movement and effort in the WHO around funding, but it is not clear that this funding translates into greater public health improvements.

Figure 11.3 depicts the three quality arrows for the socio-sphere. The arrow for discipline is long, covering two-thirds of the sphere radius and angled slightly towards excitement. The arrow for harmony also reaches around two-thirds of the radius and is slightly tilted towards excitement. The excitement arrow is somewhat

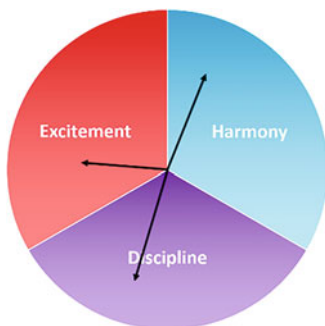


Fig. 11.1 WHO economic compass with sector arrows

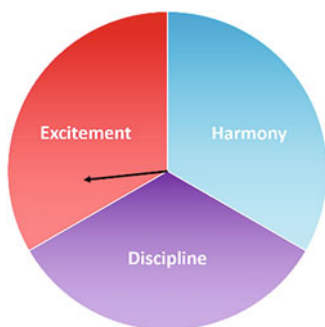


Fig. 11.2 WHO economic compass

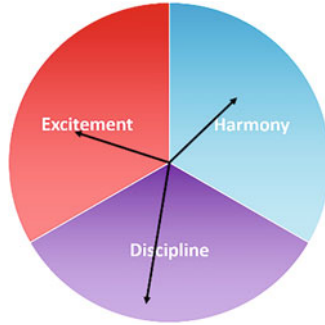


Fig. 11.3 WHO social compass with sector arrows



Fig. 11.4 WHO social compass

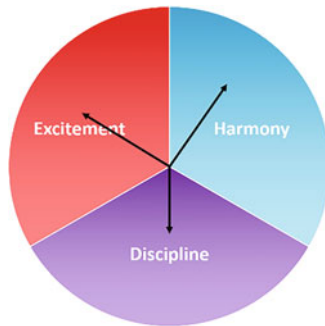


Fig. 11.5 WHO environmental compass with sector arrows



Fig. 11.6 WHO environmental compass



Fig. 11.7 WHO ecological economics institutional compass

angled towards discipline but of medium length. Figure 11.4 shows the final aggregated arrow of the socio-sphere, covering only one-third of the sphere radius and almost in the line between discipline and excitement, leaning around 10 degrees towards discipline.

Figures 11.2 and 11.4 indicate that the WHO seems to be failing at achieving harmony in human health. The in-depth analysis of the indicators showed intrinsic contradictions in how the WHO focuses programs and funding on some diseases over others. The indicators and arrows also demonstrate a lack of accountability to governments and companies who fund activities and systems which endanger public health (Figs. 11.5 and 11.6).

Then we find the final compass in Fig. 11.7. This is an ecological economics institutional compass. The final aggregated arrow here has a length of .6 length within the excitement quality angled 20 degrees towards discipline.

The final compasses highlights the amount of action and excitement happening at the WHO. The arrow being towards discipline can also indicate what was noted in the indicator analysis: that some areas of public health are improving greatly while others worsen rapidly.

11.8 Conclusions

This chapter has used Friend's innovative and holistic ecological economics institutional to analyze the WHO, the effectiveness of its policies and programs, and its role as the world leader in public health. This compass represents over 90 indicators that provide robustness and depth to the analysis. It is a compass worth revisiting with a large discussion group periodically with more indicators. Finding indicators for all the spheres and qualities has been a deep philosophical exercise that has required posing questions to the indicators and looking at them from all perspectives. As much as I was designing this compass, at a certain level, the compass was redesigning me, forcing me to adjust my thinking and switch paradigms, which was challenging but extremely interesting and necessary in today's polarized world.

The final institutional ecological economics compass arrow I believe is an accurate representation of the current status of global health. The arrow in the excitement quality reflects the dynamism, contradictions, and uncertainty of global health, while the angle leaning toward discipline reveals the negative impacts that human activity has on the environment and on the health of the ecosystem which in turn hurts humanity. Overall, the WHO is doing an effective job with the areas of health it addresses but it needs to widen its understanding of health to encompass ecosystem health and preventability of NDCs. The WHO is a necessary leader of public health and performs much-needed work, I hope this analysis brings some insight into how to achieve some stability so that the arrow lands in harmony, the health and lives of billions of people lie in the balance.

11.9 Policy Recommendations

I believe the result of this compass shows that the policies of the WHO are working but a new approach is needed. While health has increased in many parts of the world, many others are lagging behind. The majority of the world's population does not have access to basic health services while they also breathe polluted air, drink contaminated water, and live in ecosystems that are slowly dying and with them the ecosystem services they provide and that we mistakenly take for granted.

A recurring issue I have repeated throughout the data analysis is the contradiction of the system which makes us sick and then tries to treat or cure us. I also have identified two main problems with the paradigm in which the WHO functions. First, the predominant Western economic model has cost the world both ecosystem and human health. Until we do not change the priorities of the system, ecosystems will keep getting ill and with them, the humans that live in them. In developed nations we might get a false sense of ecosystem improvement as we have exported most polluting and destructive practices abroad, removing us from the harmful activities and leaving those in the developing states to deal with the consequences of our

consumer choices. Second, although we know that humans are animals that exist within an ecosystem, we do not act as if we truly understood this. We ignore the fact that we depend on the ecosphere just like any other animal: we might have been able to overcome some environmental obstacles and manipulate some aspects of nature for our own benefit, but these are simply temporary fixes that will eventually catch up to us. We cannot control nature and we definitely cannot replace nature's services such as clean water and fertile soil over the long term.

My policy recommendation is to reconsider these two points. Any policies that deal with treating conditions such as obesity or diarrheal diseases are great in the short term, but if we do not create systems that provide people with healthy and affordable food and water, in the long term they will be a waste of resources. The WHO should divide its resources to deal with both short-term and long-term solutions. Above all, repairing ecosystem health by ending harmful industrial practices and other activities that, as I have discussed create more harm than good, would be a top priority. Because the eco-sphere encompasses all other spheres a healthy ecosystem would inevitably lead to a healthy socio-sphere, fulfilling the number one mission of the WHO. Moreover, I ask that the WHO reconsider that economic development is always positive and that more money will make everyone better off. In the case of health, many times it's the opposite: less industrial production due to less consumption leads to less pollution. In contrast, economic sanctions and taxes on polluting activities may benefit public health in the long term. The WHO should not keep improving the lives of some in the short term by hurting the health of everyone in the future. I encourage its leadership to take on ecosystem health in order to achieve its goals.

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