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The Impact of Population Growth in Sustainable Development and Possible Solutions

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<p>Further prioritization of sustainable development is the first step in the right direction. In the past, because of our ambition to solve all the problems, our support was strung-out too thin, there has not been enough focus on what would create the most benefit. Although there is much difficulty in rank-ordering the most crucial sustainable development factors; it is something that must be done as it is our best path for success.</p> <p>Certain initiatives will have more positive impact than others in ways that might not be obvious at first. Of the many topics in sustainable development, increases in contraceptive access, services, and education, will create a huge amount of benefit to impoverished countries. In addition to this, it would reduce the swell of birth-rates and high fertility rates, therefore decreasing the chances of a much larger future population; thus, causing an increase in the impact our actions will have and in the quality of human capital.</p> <p>Focusing on contraception initiatives will be less costly and have a better chance of creating benefit than less predictable long-term actions. Creating more economically productive people, as well as better problem solvers, through contraception initiative is a smart short-term priority of immense benefit which could also potentially alleviate all issues related to sustainable development.</p>	
Keywords	sustainability, sustainable development, prioritization, sustainable development goals, fertility rates, population dynamics, cost benefit, disability life adjusted years, contraception

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Glossary

BCR Benefit cost ratio

DALY Disability life adjusted years

SDG Sustainable development goals

SMART Specific, measurable, ambitious, realistic, and timebound

SRH Sexual and reproductive health

SSP Shared socioeconomic pathways

TFR Total fertility rates

1 Introduction

Often discussions centered around our future turn out to be wrapped around the idea of becoming sustainable. The word sustainable referring to our human needs being fulfilled, in addition to wanting betterment towards our standard of living, while simultaneously respecting the limits of the environment. This is a conversation worth having. However, too often these conversations are characterized by division usually caused by politics, with deniers, dogmatists, and ideologues squashing any form of constructive analysis, synthesis of knowledge, or respectful debates. Furthermore, misconceptions of the general situation stem from extreme interpretations of the indicators, usually causing people to believe that we have either no impact on the planet or conversely that we have already doomed mankind. When it comes to a topic of high complexity that also comes attached with possible dangers to our species, one would imagine it would get the respect it needs, this is a discussion of our future, and we have a say in it after all. Sustainable development desperately calls for a genuine conversation or fair debate; yet, frequently people latch on to an answer that is easy to obtain with minimal energy put forth or worse they refuse to reconstruct their viewpoint in the face of new evidence. Apart from a lack of effort, poor understanding can be caused by the enormous magnitude of ambiguity surrounding the concept of sustainability in and of itself; it is inherently vague, confusing, and quite difficult to be measured or defined and put into any sort of a policy (Doukas, Andreas, & Psarras, 2007). The wide range of sustainable development issues or factors can include trade, gender, health, population, food and nutrition, education, biodiversity, conflicts and violence, energy, technology and science, climate change, water and sanitation, air pollution, governance, and poverty.

Our ability to develop while concurrently remaining sustainable is a subject that has been around for decades and will only continue to be a pressing matter. In the academic setting newly formed ideas and viewpoints are always emerging as well as transformations or reiterations of past texts or knowledge. The range of issues that sustainable development covers is vast, as was mentioned earlier. Due to this and because of the nature of the internet, paradoxically, the subject has so much material

surrounding it that anyone researching it will be overcome by a large amount of information; yet, they will starve for true wisdom. Even as early as 1798, in the academic literature, sustainability had been explored when professor Thomas Malthus discussed population in relation to the amount of food available. This was described in his, *Essay on the Principle of Population*, which shortly after releasing even in this time was fiercely debated (Warms & McGee, 2013). Another early investigative source on the subject of sustainable development, outside of government, was the organization of individuals that made up the Club of Rome. Created in 1968, after a few years of formation shifts, their first credible report came out in 1972, *The Limits of Growth*, which studied the "...viability of continued growth in the human ecological footprint (Club of Rome, 2019)." Although Thomas Malthus, the Club of Rome, and many other academic sources in the past investigated questions related to sustainability early on, the discussion in the academic setting really took off in the later portion of the last century up to now; plus, it has continually grown and become of great interest in the public sphere in addition to non-academic sources.

As popular a topic it is with academic sources, with non-academic news sources the matter is frequently discussed. Most often what the news sources talk about is business related, and of course, underlyingly they are always pursuing that which will sell. Usually what they imagine will sell follows something along the lines of "if it bleeds, it leads," although perhaps what is typically seen as newsworthy and devoted to sustainability is almost exclusively climate-related with finger pointing, a reference to the coming apocalypse, or both. Furthermore, the typical news cycle is much quicker than it used to be, because of the internet; therefore, focus on a complex topic like sustainability comes and goes within a few hours of a day. Forbes recently released an article, "Our Favorite Sustainable Brands To Support On Earth Day," which briefly mentions the environment but then quickly turns into an advertisement and follows the trending earth day spike of interest. This brings into question the motives behind the article but more importantly shows that depending on the time of year trends are likely to bombard what a reader would be able to find about sustainability. More terribly TIME not long ago published an article titled, "At What Point Should You Start Really Freaking Out About Climate Change? Right Now," which attempted to rile the reader's emotions and guilt them on how they should prioritize climate change but presented nothing in the form of

a solution or means of supporting the cause; thus, summarizing exactly the hopeless and unreliable situation typically seen in the non-academic setting.

Once in a while articles with substance are published by the news media that brings attention to innovations or technology. Carbon capture has been in the headlines in the recent past, although it has been around for a couple of decades the process only recently passed through the American legislature. A rather promising or at least intriguing process, it involves pulling carbon dioxide out of the air and storing it (Weise, 2019). An article such as this one brings a glimmer of hope. Still, stories of real interest are usually not followed up on as was the case with The Ocean Cleanup, with its headquarters located in The Netherlands, the group's core purpose is to reduce the great pacific garbage patch (The Ocean Cleanup, 2019). When the team launched their cleanup device from the San Francisco Bay, it was in the media spotlight; however, now months later the only way to get an updated story is by going directly to their website. Regularly, although not every time, news content is dramatized and panic-inducing in the hopes of increasing the negative emotions of the reader, usually fear or anger, while presenting no solutions. Even if the news focuses on something other than climate change, only one aspect of sustainability, they still typically fail to examine anything useful. For any individual who would want to look deeper into sustainability, academic sources are the way to go as pitfalls surround non-academic sources and call for bottomless digging only sometimes providing little help.

Arranging a logical construct requires some basic knowledge, such as definitions, to be examined first creating a building block, this background information then permits more complex matters to come in to play. The problems in the past, such as problems with ambition, policy, and actions, are heavily discussed showing the real need for a new approach or model. The new model is then delved into deeply followed by an application of the model and analysis of what it shows. The overall reason for researching into sustainable development was to find answers to the many questions that come with it. The initial question was how do we make the world better in concern to sustainable development. Some other very important questions included: how do we define sustainable development, how do we overcome past challenges, what are the worst yet most solvable issues regarding sustainable development, are there any alternatives,

what are the risks and opportunities, how can we do the most amount of good in the shortest period of time with limited resources, how do we rank order sustainable development, is rank-ordering sustainable development an ethical issue, what tools and models are at our disposal for analysis of sustainable development.

Sustainable development is vital to discuss and analyze to create the future we want. Our fate could become dim if not enough or the wrong actions are taken, and the potential for a catastrophic future could increasingly become a reality. In both the academic setting and non-academic setting discussions and analysis does happen albeit with plenty of pitfalls. There are many different components within sustainable development, but this should not scare us only it should call out the best in us. This situation we are faced with requires the most of our efforts, not by thinning out our support and resources to everything that could be categorized under sustainable development but instead by focusing in on the most beneficial short-term oriented tasks. We should do this because that is the best way of overcoming the situational challenges.

2 Literature Review

Sustainable development, a notion that has been around for decades, has over time been reinterpreted and often convoluted by partisan interests. Back in 1987, the United Nations released the Brundtland report in which one of the original definitions of sustainable development was included, it stated that it "... is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The commission also laid out some key components to the concept of sustainable development: priorities should be given to the essential needs of the poor worldwide, social organizations impose limitations as does the state of technology, the present and future needs exceed that of the environment's ability (UN, 1987). Within these components of development is where the need for progress and change lies. Solutions such as prioritizing issues and creating organizational_improvements are of utmost importance.

Quite often when it comes to what has been prioritized in the past, headline issues, problems that pander to our basic emotional appeal such as crying babies, wounded animals, or more currently plastic straws stuck in turtles, have captured the public's focus. The result is attention, effort, and money spent on what makes us feel good and not what could be most beneficial to the planet and humanity. This is in line with what has taken place in recent time, in the critically important global event, the United Nations conference on sustainable development held in Rio back in 2012; the development agenda was extremely broad and unreasonably complicated. What took place as it has time again in the past was "...an all too common mantra employed by governments, corporations, and communities alike to signal their social and environmental ambitions and intentions without necessarily taking the necessary means to follow through on their commitments (Bulkeley et al., 2013: 960)." Conceptualization, framework, and implementation matter when it comes to a governance agreement. After all, this is where we need understanding, guidance, and cooperation. Ambitions and intentions only get the ball rolling to a certain point; eventually much more is required. The UN conference in Rio now comes to be recognized as a fundamentally flawed event due to the realization that perhaps the concept's greatest strength in flexibility the need to include everyone's ambitions, in addition to a lack of clearly defined goals or better yet a willingness to accept a loose meaning, has also become a core weakness. There is no lack of ideas which is part of the first steps, but there is a lack of categorization and implementation which is what must follow (Bulkeley et al., 2013: 965). Nonetheless, this is not the only time a critical event fell short because of the attention given only to good ambition and intent. Again in 2015 the United Nations Sustainable Development Goals, or SDGs, started with 1,400 suggested targets which were reduced to a draft of 212 targets then finally condensed to 169 targets and 17 goals. This was back then and still now to be achieved in 15 years. Even though there was a good intention in creating inclusion and international engagement, it reduces our amount of focus; thus, creating fewer goals reached and goals that will have little positive impact on sustainable development. When there are 169 targets and 17 goals that include such complex pressing tasks like universal access to contraception, expanding immunization, reducing malnutrition, cutting outdoor air pollution, and phasing out our dependence on fossil fuels, we are not really being pragmatic about our abilities. A little help everywhere is not as good as a lot of help and improvement in what matters (Lomborg, 2018: 7).

When it comes to Sustainable Development Goals, there is a strong need for relevant indicators. A good set of steps in the right direction for SDGs would be in condensing the message, limiting the number of goals, and creating universally applicable frameworks (Hák et al., 2016). This could be achieved through analysis by experts of all the targets and indicators while using the SMART target criteria which stands for specific, measurable, ambitious, realistic, and timebound (Maxwell et al, 2015). The usage of this tool could cut back on the overlaps in targets, variables, and data gaps amongst other difficulties. There is importance additionally in creating the right type of headline indicators for the general public one that does not appeal to impulse rather a headline that conveys a strong message in order for the SDGs to get the proper societal backing it needs (Hák et al., 2016). Furthermore, "The respective indicators must then certainly follow all the rules of sound science (robustly supported science, confirmed by multiple peer-reviewed studies) and respect data constraints but at the same time they must be strongly relevant for the given target (Hák et al., 2016: 573)." To increase our chances at achieving the Sustainable Development Goals, we need more effort put forth towards the indicator framework which in turn would develop a sturdier theoretical and methodological work to be easily guided by rather than a work of mere statistics that is incomprehensible and unguiding (Hák et al., 2016).

A sturdier theoretical and methodological framework does not only apply to the global level, but it also applies to the state and different district levels. A homogeneous outline plus equal access and credibility across the levels would increase the productivity of future scientific research. More specifically, in the future, the preparation and maintenance of data, for example in concern to biophysical consumption, across all levels should be emphasized for general awareness and better scientific research. Perhaps a bottom-up analysis would be the most appropriate method for policymaking and implementation; in which, "...data collection, assessment and designing framework for implementation..." could start from village or town, at least district level, moving upward to the larger national scale (Ajishnu & Kousik, 2019: 1061). This would be beneficial because data that is comprehensive and long-term for many indicators remain unavailable at all levels but especially the lower levels such as villages and towns which is to the detriment of our accuracy to pursue sustainable development as best as we

possibly can. Thus, one crucial "...aspect of any shift towards sustainability will have to be a greater recognition that the environment and development agendas cuts across spatial scales from UN conferences, regional organization, and national governments to local town halls and individual households (Bulkeley et al., 2013: 962)." The inclusion of global, regional, and local authorities will create a better foundation for the system of governance on sustainable development. The time has come for us to be more pragmatic and theoretical about what the endeavors of smaller scale sustainable bodies and organizations entail (Lawhon & Patel 2013 cited in Bulkeley et al., 2013). The way we govern sustainable development has not been sufficiently outlined or scaled across the appropriate levels which creates huge limitations in implementation and beckons for a reliable scaling. A more significant shift towards sustainable development is possible once a dependable framework has been shaped which could be achieved through a homogeneous outline allowing for a more credible collection of data leading to stronger scientific research.

Other factors must be taken into account when analyzing the challenges to sustainable development. The equation $I=P*A*T$ helps summarize potential factors in which I represent impact, P is population, A is affluence, and T is technology. This was created back in the '70s as a tool to break things down, and the equation represents how our sustainable impact. Starting with technology, when it comes to the impact technology has on sustainable development disagreements persist. There have been times where technology did drive us forward. Quite often though there can be an unthorough and questionable optimism attached to it; confidence that is predicated primarily on the hopes of a simple solution to a complicated matter. In this situation the belief that not much action is required in order to become sustainable one day because technology will eventually solve the problem. However, the development of technology is unforeseeable and frequently technological solutions end up just accelerating the developments of production (Schnaiberg & Pellow 2002 cited in Lorek & Spangenberg, 2014). Additionally, the current and common conventional economic thinking in business will not provide the driver for sustainable development (Lorek & Spangenberg, 2014). The next factor, population, refers to the consistent increases in population over the past decades that can diminish the positive effects of sustainable development in addition to any technological advancements. The world population cannot increase so rapidly; a

slower increase of people is of the utmost importance. Finally, the amount of resource consumption per capita, represented as affluence, must effectively decrease and disperse more equally, this is because we have limited resources and we have no ability to change this constraint so we must adapt to it. Indeed, it is well known that this planet has limited resources and we are confined by this law of the world. All of these factors can disaggregate the environmental impact. Much of this, is in fact commonly known but the complexity of it is not, and a large proportion of people do not understand that many positive effects towards sustainable development are reduced by increases in population for instance. This again is where there is a need "...for better governmental leadership as well as stronger engagement of civil societies and their organizations. Strengthening social innovation and clear convincing messages about the benefits of sustainable societies as well as of the risks of unsustainable ones..." is a crucial element in the direction of successful development (Lorek & Spangenberg, 2014: 44).

Most people would agree once they have some general knowledge of the problematic shortsightedness of ambition and intention as well as a lack of inclusiveness with global, regional, and local authorities that without any dedication to reliable framework for, implementation, monitoring, plus the ability to evaluate the impact later, our efforts will always be limited. Much of the limitations facing sustainable development, though not all, could be solved by improving governing bodies or perhaps even by creating new organizations. Furthermore, in order to pursue sustainable development properly, we should set our attention, effort, and money towards what could be most beneficial to the planet and humanity as mentioned earlier. The factors of population, affluence, and technology must always be kept in check, in addition to this, we must remember that we cannot overcome the restriction caused by limited resources. With all of this in mind, the use of prioritization is a vital element one which is not always emphasized today but could better equip us to succeed in our hopes for sustainable development.

Once prioritization has been recognized as imperative the next step is in the creation of a rank-order of the issues at hand in order to be able to focus on the most beneficial tasks. Nonetheless, rank-ordering the issues is where most of the debate and examination ensues, what issues call for the most amount of focus in order to create the most amount of good, and also what can be accomplished in the shortest period of time.

All of this while remembering the restrictions $I=P*A*T$ equation. Examination of a single issue requires taking into account a full comprehensive view of the effects of an action. Understanding the trade-offs is typically easier at a national level and much harder yet imperative on a global scale (Lomborg, 2018: 4). No matter the difficulty of creating a rank-order of sustainable development issues; it certainly is an achievable goal if the solutions are well informed and aimed at the world's biggest problems (Lomborg, 2018: 6). Furthermore, there are not too many good options on the table, and these problems can have such an enormous impact on humankind that they must be attempted as best as we possibly can otherwise it could be at our peril. A cost-benefit analysis, as with every method, is debatable as a systematic method in order to analyze sustainable development, but regardless of this, it remains a good way of focusing clearly on the most effective solutions to real-world problems that afflict most people (Lomborg, 2018: 6).

Depending on what factor of sustainable development one is examining it may insist on the use of DALYs or disability adjusted life years. Although this is prominently used, every method has some amount of weakness there is no single method that is better in every way than the others which is why tackling sustainable development is so hotly debated, and all the techniques that could be used are faced with the ethical conundrum of placing a price on life plus the lack of enough definitive data caused by the gap in levels mentioned earlier (Lomborg, 2018: 11). One disability adjusted life year, singular, represents a lost year of "...healthy life..." while the sum of disability adjusted life years, multiple, tries to examine the burden of disease across a population essentially measuring the gap between the current health state and an ideal health situation (WHO, 2019). This is followed often by an attempted to systematically spend money, effort, and resources equitably to improve the health situation. The tool was introduced in 1994 in a World Health Organization (WHO) article Entitled "Quantifying the burden of disease: the technical basis for disability-adjusted life years" which explained the calculations behind DALYs (Journal of Global Health, 2014).

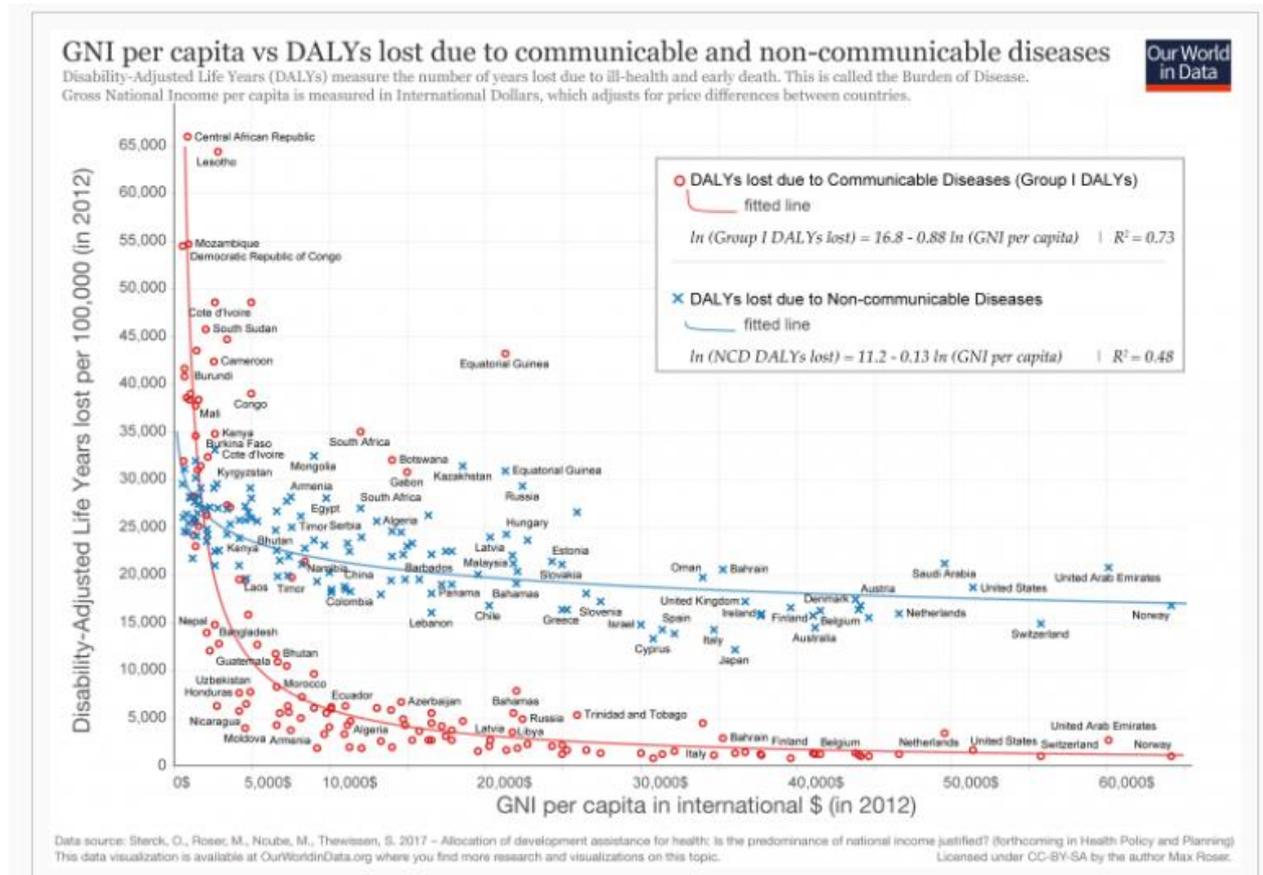


Figure 1. A graph representing average income in relation to the burden of disease (Roser & Ritchie, 2016).

Figure 1 shows an example of an instance when DALYs were used in order to represent how average income per capita had an influence on the number of healthy life years lost with the red line indicating diseases that are contagious and the blue line indicating diseases that are non-contagious. Many African countries are low when it comes to average income and high in life years lost while countries in North America, Europe, and parts of Asia had high average income levels and low life years lost. Thus, showing the correlation that countries which have a lower average income do not have the same state of health care as do the higher income countries and therefore lose out on years lost. Essentially, DALYs attempt to create a more cost-effective and equitable health care structure (Murray & Acharya, 1997). However, they do not go beyond this, and ethical issues pertain to this tool as it can be viewed as valuing life unequally. The problem in attempting to both measure the overall burden of disease and to also guide the allocation of resources is that improving the total state of health and improving

equity are not always in the same alignment; therefore, this tool can result in conflating health and economics. In addition to this, by devoting most of the effort and resources only on health-related issues this could result in focus given to the wrong issues and hinder the potential for an action unrelated to health that could yield more benefit; after all, DALYs are a tool used for analyzing and for prioritization only global health and do not provide a complete analysis of what could be included in sustainable development (Parks, 2014). For this tool to be better, it would need to reflect the priorities established within disease and health followed by a comparison of the most pertinent health issues to that of all other categorical factors associated with sustainable development such as lack of food, high pollution, education targets, etc.

A cost-benefit analysis "...is a process of identifying, measuring, and comparing the benefits and costs of an investment project or program (Mishan & Quah, 2007: 1)." It can supply the decision maker with the opportunity costs, which is the value of what could have been produced or pursued compared to what was, for example "...a proposal to reduce the highway speed limit: this measure involves a cost in the form of increased travel time, but benefits in the form of reduced fuel consumption and lower accident rates (Mishan & Quah, 2007: 2)." Overall, the role of cost-benefit analysis is to provide information to the decision maker.

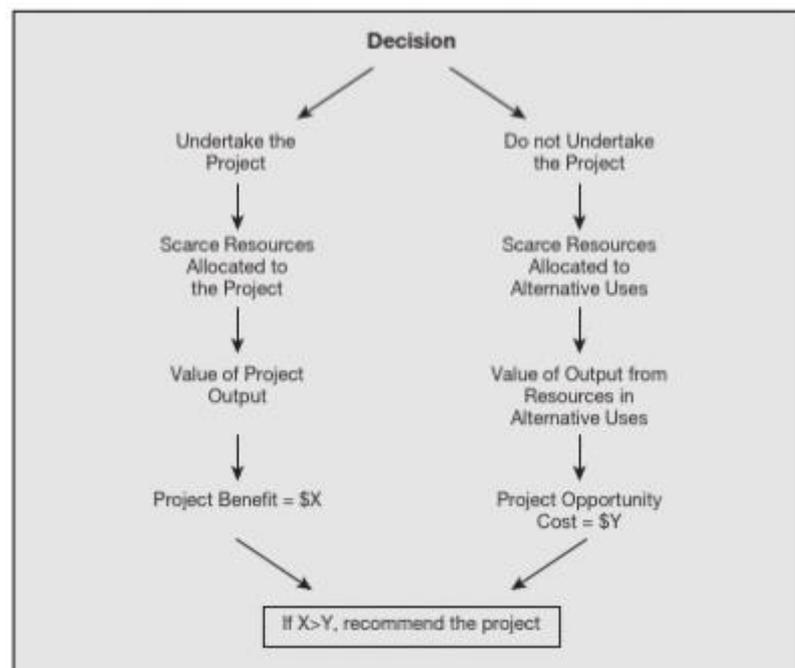


Figure 2. Two pathways to a decision through the use of cost-benefit analysis (Mishan & Quah, 2007: 3).

Referring to figure 2 an example to sustainable growth, in the form of a hypothetical situation, could be that due to the consequences of scarce resources the need to make a decision arises to make investments to tackle poverty, a decision that was made because of an examination of the opportunity costs which concluded in a higher benefit if poverty was prioritized, hence there would be less investment allocated to climate change. Too often decisions are presumed to be made based on little research when in fact they are made through a calculative process. Additionally, when it comes to a situation such as sustainable development with many potential paths, the decision making becomes increasingly important and as mentioned by the WHO prioritization needs to be given. The weaknesses of cost-benefit analysis are not too severe though they should be explained. Something to keep in mind when using a cost-benefit analysis, is that the costs will not always be in the form of money instead it could be for example in labor or time, in addition to many other possible forms of a cost, it could also be pointed out that the benefit does not always end up being equal to a dollar amount. Additionally, when using this systematic method, it is predicated on valuing all individual people's worth as equal, how to measure people's worth, or human capital, in and of itself is highly debatable and can even be interpreted as being down-right offensive to represent the value of human being. Finally, just the fact that this method focuses on money might pose a problem to some in that money should not be the focal point of sustainable development, yet that is an arbitrary argument because in order to pursue sustainable development a cost-benefit analysis would only be helping in the reduction of unhelpful costs while simultaneously increasing the amount of money spent on beneficial costs in order to have a more significant impact on development which does require the catalyst of money. Essentially, though all methods have weaknesses when looking at sustainability, it is hard not to be persuaded by the strengths that a cost-benefit analysis has in representing high benefit-cost ratios while at the same time presenting very low ones (Lomborg, 2018: 11)

A massive problem with sustainability is in consensus, many people would argue against the use of any form of systematic analysis; however, this is because there is no

consensus on the range of indicators, data collection, and more generally in the assessment and design of any framework. Frequently it has been said that “Changing the way society measures progress represents a key leverage point in tackling the root causes of unsustainable development (Hjorth & Bagheri 2006 cited in Pintér et al., 2012).” Indeed, tackling the issue of measuring progress would require an extraordinary amount of cooperation and data in concern to a matter with possibly infinite variables, and so far this has not been attempted adequately as was explained earlier. Thus, even the methods used in this paper are dependent on subjective approaches due to there not being a universally recognized paradigm, or even a general outline, that is applicable and unanimously accepted to sustainable development.

The primary purpose of this research is to focus on sustainable development and a systematic method to better dissect it, which will be through a cost-benefit analysis that also applies DALYs in its calculation. However, the relationship between sustainable development and cost-benefit analysis cannot be examined without mentioning the leading proponent for this course of action, Bjorn Lomborg. Bjorn’s work, especially his early work, has been heavily criticized but has also seen its share of praise, both a product of his alternative viewpoints. After all, the future we will have, and humanity’s ability to become sustainable; are topics of much importance due to the potential for catastrophe and can result in strong viewpoints. Many of the criticisms against him have validity; nevertheless, plenty of the backlash has had absolutely no credibility, for example resulting in name calling, and have motives that seem disingenuous possibly caused by political posturing and are in no way objective. A reason there has been contention with Lomborg’s work right from the start was due to the reason that it was published in the social science category of discipline (Friel, 2010). Of the criticisms, the one that stands out is in the disapproval of his data. Collection and analysis of data is quite often a point of contention although this is common for this sort of topic as has already been detailed in the lack of any framework consensus for sustainable development; nonetheless, it is said that Lomborg made many mistakes (van den Bergh, 2010: 33). At different moments in *The Skeptical Environmentalist*, the controversy lies in the books neglection of literature that does not support his views in addition to an overemphasis of work that does support his views (Schneider 2001 cited in van den Bergh, 2010). More specifically when it comes to the use of global trends this is

especially said to be true (van den Bergh, 2010). Selective use of data certainly would take away from the strength of Lomborg's book. It is the most mentioned criticism of the text. However, many disagree and believe his presenting, discussing, and interpretation of the data to be valid. Many of his sources in the book are the exact mainstream sources that critics use; nevertheless, it should be mentioned that in an extensive list of references not all that were collected were mainstream and perhaps this is where the criticism is specifically aimed (Stone 2001 cited in van den Bergh, 2010). Additionally, in the past, Lomborg did not represent the effect that population has had sufficiently as was the case with poverty; which he attributed the leading causes like hunger and malnutrition neglecting the contribution that population increases had on adding to the growth of poverty (van den Bergh, 2010: 12-13).

Even though critics say that Lomborg overlooks validation and truth in favor of support for his viewpoint, there is a significant problem with all theories or views concerning the topic of sustainable development, the truth is repeatedly ignored to create the specific narrative that people want others to believe in (van den Bergh, 2010: 47). His earlier works, especially *The Skeptical Environmentalist* and *Cool It*, were easier to criticize and they focused on climate and the environment, however his recent collaboration: *Prioritizing Development, A Cost Benefit Analysis of the United Nations' Sustainable Development Goals*, has the support of well-established contributors who have worked in universities all over the world and in organizations such as: The United Nations, International Food Policy Research Institute, World Bank, Center for Global Development, United States Agency for International Development, etc. This book grapples with that which is directly stated in the title it identifies a set of development targets and argues their vast benefit. The cost-benefit analysis as used by Bjorn Lomborg attempts to encompass all relevant issues to sustainable development. Indeed, as stated numerous times, his rank-order is not a unanimously accepted piece of work; however, it is a step towards precisely what is needed: a proper framework.

Sustainable development initially defined as the development that met "...the needs of the present without compromising the ability of future generations to meet their own needs (UN, 1987)." The solutions to it, although hard, can be achieved through adjustment of the issues, in the creation of an agreeable methodology and organizational

improvements generally speaking. Simultaneously, although technology should be enhanced it should not be accepted as the solution to sustainable development, and factors such as limited resources, fast population growth, and the number resources consumed per person need to be monitored with precision; otherwise they could have huge impacts on any actions thought to progress development. The current setting of organizations in recent years has been bleak, and the United Nations meetings have once again given little commitment to prioritization and instead these critical events were superficial because of their need to include every target suggested. There was incredibly too much overlap. Moreover, what is needed is relevant indicators, concise goals, and an acceptable strong framework to achieve these goals. Part of this requires a homogenous outline that is even today not up to par, incorporating stronger ties between different levels of authority and responsibility like at the global and state level, even so far as to the accountability of a town, would allow for the collection of more credible data. In the past, the public's priorities were a result of emotions. With that in mind, well calculated prioritization would still be an essential approach and rank-ordering development concerns could then allow for a cost-benefit analysis to take place. This, although open for criticisms as all tools are, remains one of the best systemic methods for an all-encompassing exploration of the sustainable development priorities. In Bjorn Lomborg's most recent collaboration with numerous economists, there is an attempt to bridge the gap and illustrate sustainable development concerns in a rank-order predicated on the cost-benefit relationship. Sustainable development as originally conceived requires more from humanity it is after all up to us to tackle this problem as best as we possibly can, we would have a higher chance of achieving our goals if we went forth with emphasis on the assortment of factors as were detailed.

3 Methodology

The paradigm used in this research is interpretivism based on the principle of idealism. This research attempts to have no preconceived notions. Therefore, during the research process, the pursuit was not to agree or disagree with a particular viewpoint from the existing text but instead to examine different angles of the topic in order to gain, as best as possible, an unbiased in-depth insight. Understanding a complicated situation or topic

is indeed the whole point of this research which can be done through a critical analysis of already existing concepts related to the topic; synthesis of these concepts and then generating a framework for the creation of explanatory theory (Collis & Hussey, 2014: 43). Furthermore, this method allocates new meaning derived from complex and even confusing phenomena by separating out individual components of a topic or situation and then unifying the components into a more coherent concept (Davidoff, 2019: 1). This process of investigation is in line with the explanatory theory.

Explanatory theory emphasizes subjectivity and an interpretive understanding of phenomenon through the use of qualitative analysis. It is a process of inquiry conducted methodically to increase knowledge of the topic (Collis & Hussey, 2014: 43). Additionally, the focus is placed on meaning and reflection of different parts of the issue (Dudovskiy, 2017). The text primarily used and analyzed in the research was Lomborg's collaboration, *Prioritizing Development*. As well different research and data collected from sources such as the United Nations and The Lancet, an online peer-reviewed journal was used, all of which were in no relation to each other besides their analysis of a similar subject.

The original intention was to examine different viewpoints on sustainable development. It quickly became apparent that the scope of this would be too big, all in all, sustainable development is a complex issue made up of many variables and to produce something comprehensive on such a large scale would require years of research. Therefore, after extensive investigation with the intention to narrow it down, the criteria of the text needed: to be current, to be business related, to have a unique viewpoint but still be valid for academic purposes, to have a decent amount of notoriety. The book, *Prioritizing Development*, was released in 2018 and it was based on business concepts, for example in the book they use cost-benefit analysis and opportunity cost, which was applied to the issues related to sustainable development. Additionally, although Lomborg is attached on the cover because of his many similar books and work with the Copenhagen Consensus, it was not the creation of a single person but an effort put forth by a group of people. The objectives for the research on sustainable development is to review and synthesize existing knowledge, to investigate examples and problems, to explore and analyze general issues, in a combination of all (Collis & Hussey, 2014: 2). For these

reasons the strategy taken was to analyze this book and then compare its findings and conclusions to peer-reviewed articles and governmental findings allotting an investigation of the problems and differences and then synthesis of the knowledge.

The method taken uses different secondary data or researchers' independently collected data on the same phenomenon allowing for comparisons in the results (Collis & Hussey, 2014: 71). Some data is numerically represented and some nominally; however, the main focus is on the qualitative analysis of the data. Since there is an abundance of research on the general topic of sustainable development; a comparative study allows for the use of multiple sources of evidence triangulated to explore the phenomenon to obtain in-depth knowledge (Collis & Hussey, 2014: 68). The triangulation of data, data that was collected from different sources at different times allows for a broader complementary view and study of the phenomenon (Collis & Hussey, 2014: 72).

A study designed under the interpretivist paradigm needs strong rationale and qualitative analysis in the form of more detailed explanation that is rigorous and methodical. Interpretivist studies are associated with methodologies using hermeneutics, participative inquiry, ethnography, case studies, action research, grounded theory, or feminist/gender and ethnicity studies (Collis & Hussey, 2014: 60). In this study, grounded theory is the central methodology used in which there is a combined collection, categorization, and analysis of data from an organized set of procedures to lead into a consequent theory about phenomena. Secondary data was used in this study which is data that was not collected personally but obtained in published articles which had tables, graphs, and appendices containing statistical information (Church, 2001). Grounded theory is normally used in combination with interviews but can be used with data that was collected from observation or any of the data collection methods linked to an interpretivist paradigm. The grounded framework was originally conceived in reaction to positivist theories which had theoretical frameworks, established hypotheses, and which had collected data that were used to test the hypotheses. The grounded theory method could lead to conclusions on these theories by testing the research that was considered to only use relevantly collected data while ignoring data that could be useful for explaining what is happening. Additionally, some key stages of grounded theory are:

an attempt to develop initial categories that illuminate the data, the use of theoretical sampling to confirm these initial theoretical categories by including many different social settings in an attempt to 'saturate' the categories with many appropriate cases in order to demonstrate the importance of the categories, constant comparison as new data are used to modify the categories and develop them into a general analytic framework with relevance outside the research setting (Collis & Hussey, 2014: 70).

This study pins Lomborg's collaborative theoretical framework and data against other data using a similar framework to explain better what the phenomena indicates. The data of different sources are used in order to determine the credibility of Lomborg's framework. This procedure is consistent with a qualitative approach.

There are a few general advantages of a qualitative research approach such as the approach is open-ended and dynamic, it creates a greater depth of understanding, it is less expensive and time-consuming, it offers flexibility in data collection (Katewillis.co.uk, 2009). One of the main challenges with qualitative analysis is the fact that it relies on observing quantitative data with a set of conventions for analysis that are not clear or unanimously accepted; in fact, the actual method of analysis remains poorly defined. Additionally, the data collection method can be hard to distinguish if it is integrated into the basis of the analysis. A smaller scale issue can be the difficulty in acceptance of how a researcher summarized and structured pages of qualitative data and their subsequent conclusions (Collis & Hussey, 2014: 154). The status of qualitative research is disputable. There can be an issue of credibility; nonetheless, it supplies value in studying meaning as well as causes (Silverman, 2014: 400).

A potential problem present in the grounded theory methodology is the difficulty in dealing with a considerably large amount of data and the generalization of the conclusions. As in many methods, it can be a very time-consuming process, though it is set within a certain context. Likewise, a comparative study has a disadvantage as it can be difficult to access suitable cases and the research is very time-consuming, as well it can be hard to choose the scope of the study. An advantage of the grounded method is that it can be based on the observable themes and patterns within the context instead of the theory. Additionally, grounded theory methodology allows for systematic

comparisons that are made between and within cases, in order to observe patterns of dissimilarities. Finally, the framework allows for alternation between inductive and deductive thought; in which, "First, the researcher inductively gains information that is apparent in the research data. Next, a deductive approach is used to allow the researcher to turn away from the data, think rationally about the missing information and form logical conclusions," and once conclusions have been drawn, a return to an inductive approach allows for tests of these tentative hypotheses with new or existing data, then reverting to the data, the deducted suggestions can be refuted, supported, or modified, lastly, the supported or modified suggestions can be used to form new hypotheses and further investigation (Collis & Hussey, 2014: 181).

The research conducted in the data presentation and analysis has a few limitations. As was already noted, any research done in concern to sustainable development is highly debatable due to there still being a strong need for more relevant indicators. Much of this is because of the lack of homogenous data collection from the local, regional, and global scale. Another limitation lies in the fact that not every rank-ordered development issue drawn out by Lomborg will be examined, because of time constraints and a lack of comparable academic appropriate studies to each specific issue. For these reasons, effort must now be spent on only those development issues that can be linked to strong independent cases of comparison.

This research on sustainable development takes an interpretivist stance in order to better understand the phenomenon. The research mainly examines Lomborg's most recent published collaborative work and therefore is heavily reliant on it. Since theories have been established the intention is to take it further with a collection of the data regarding the same topic but by other researchers as well, this triangulation of information then increases knowledge of the topic and gives way for new ideas about the phenomenon. Comparative studies are used to help drive the point; however, it does come with limitations, mainly time constraints. The analysis is linked to the literature from earlier to also make conclusions about the subject as a whole. Next is a presentation of the data collected and an analysis of the findings.

4 Data Collection and Analysis

The central concept of, *Prioritizing Development*, is predicated on the use of a cost benefit analysis which attempts to measure actions that result in the most amount of good, towards sustainable development, for every dollar spent. The tools used to calculate this were DALYs in order to gauge the impact of life lost in addition discounting is used "...which makes it possible to balance our own needs against those of future generations and to ensure a consistent approach across all the challenges presented... (Lomborg, 2018: 9)." This is all summarized in Figure 3 which is the result of the median of four estimates: two DALY values, at 1,000 and 5,000 dollars, and two discount rates, at 3 percent and 5 percent. However, in order to gain a better understanding of the figure's entirety and test the validity of it; an examination of the components that it is made up of is crucial.

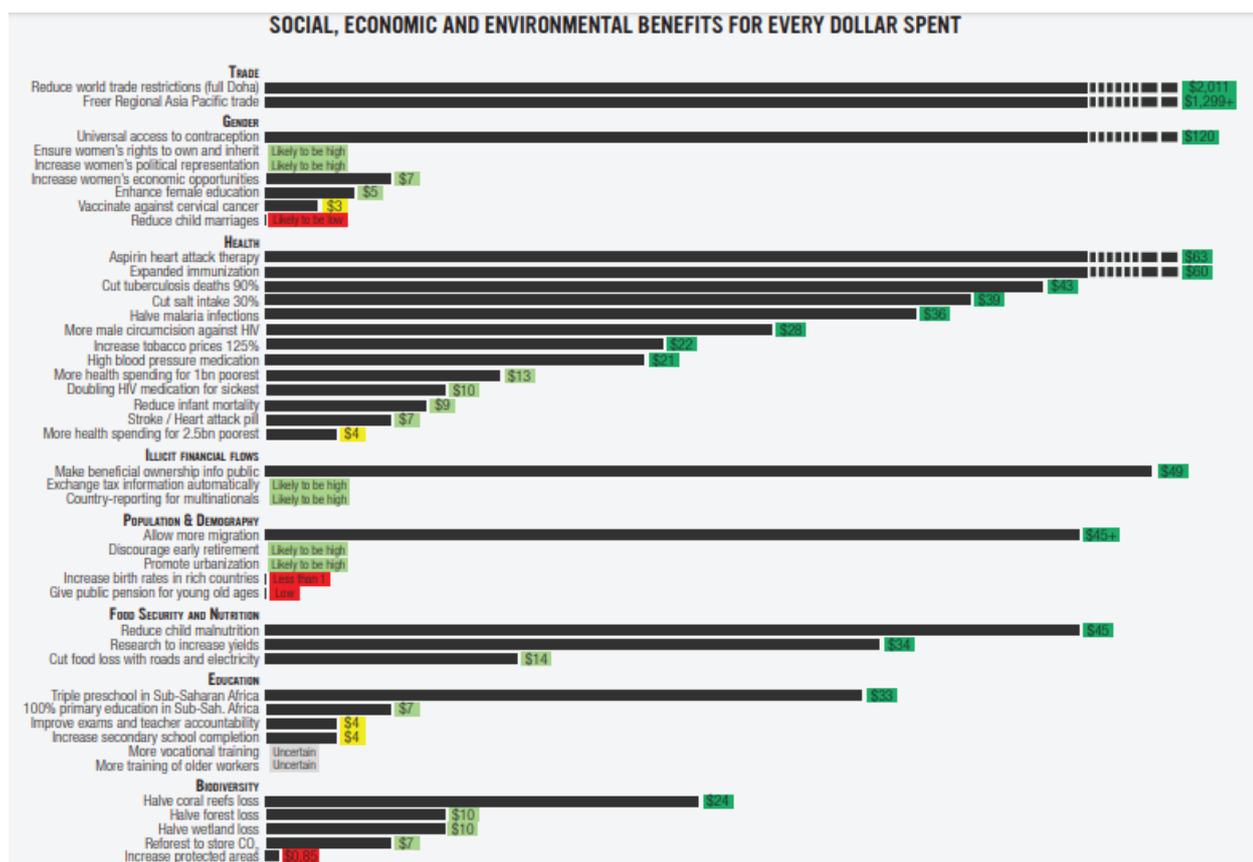




Figure 3. Economic, environmental, and social benefits for each dollar spent (Post-2015 Consensus, 2015).

Lomborg presents trade liberation at the top of the cost-benefit figure which means that these points are believed to produce the highest amount of benefit; however, the subsequent investigation will be placed on the purposed third highest creator of benefit, the topic of universal access to contraception shown here to produce phenomenal benefit and a return of 120 dollars for every dollar spent. Although trade and the manner in which it could benefit development would be interesting to investigate, research on that would require first an investigation with an economic lens and then into sustainability, next relating the two, and finally drawing that back to the validity of the work; therefore, it would require much more time to be able to represent the full scope of trade. There is much more directly comparable data on contraception's relation to gender and population which is a direct element of sustainable development.

In order to analyze the importance of contraception, the dynamics of population and the relationship between the two must first be understood; without this, planning and policy-making will be of little to no value. The total global population, as most people know, has been growing swiftly, it has been increasing especially within the last hundred years and today sits slightly over 7.5 billion (US Census Bureau, 2019). Future projections

rarely agree, as represented in Figure 4, the methods used to project population differs and there remains a large amount of uncertainty.

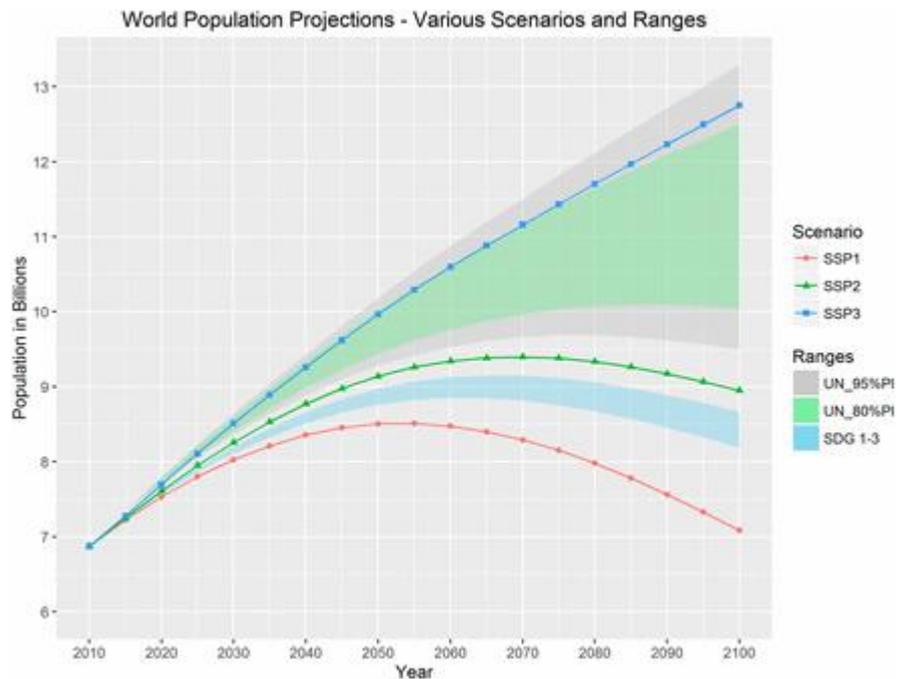


Figure 4. The differing projected population growth estimates according to three shared socioeconomic pathways (SSP), the ranges given by two probabilistic UN projections, and the difference that the first three sustainable development goals, especially in female education and reproductive health, can have on population (Abel et al., 2016).

Population was also a significant factor in the $I=P*A*T$ equation shown earlier which represents the negative relationship population has on our impact. In addition to that circumstance, another connection not commonly understood is the major implications of population dynamics such as youth bulges, population aging, migration, and urbanization. Population dynamics such as these

present both important developmental challenges and opportunities that have direct and indirect implications for social, economic and environmental development. They affect consumption, production, employment, income distribution, poverty and social protection, including pensions; they raise the stakes in our efforts to ensure universal access to health, education, housing, sanitation, water, food and energy; and they put increasing pressures on the

planet's finite resources, contributing to climate change and challenging environmental sustainability (IOM, 2013: 9).

Needless to say, the impact that population dynamics have are unbelievable. In examining one dynamic, the youth bulge, interestingly, total fertility rates (TFRs) have been decreasing since 1950 yet despite the reductions the population has gone up. A major reason for this is caused by declines in mortality which certainly is an excellent bit of progress; it is a significant goal as well to reduce mortality (Global Health Metrics, 2018). Still, demographic trajectories vary much more today than during the twentieth century, and it is important to understand different regions as the regional rates vary. Although TFRs have gone down, rapid increases in the number of young people have continually been experienced in certain regions like southern Asia and Sub-Saharan Africa which will result in the most enormous swell of young people ever. A huge cause of this is because of these regions' high fertility and an often-unmet need for contraception (Lomborg, 2018: 375). In 2017, Sub-Saharan Africa alone experienced growth rates near the highest reported levels ever (Global Health Metrics, 2018).

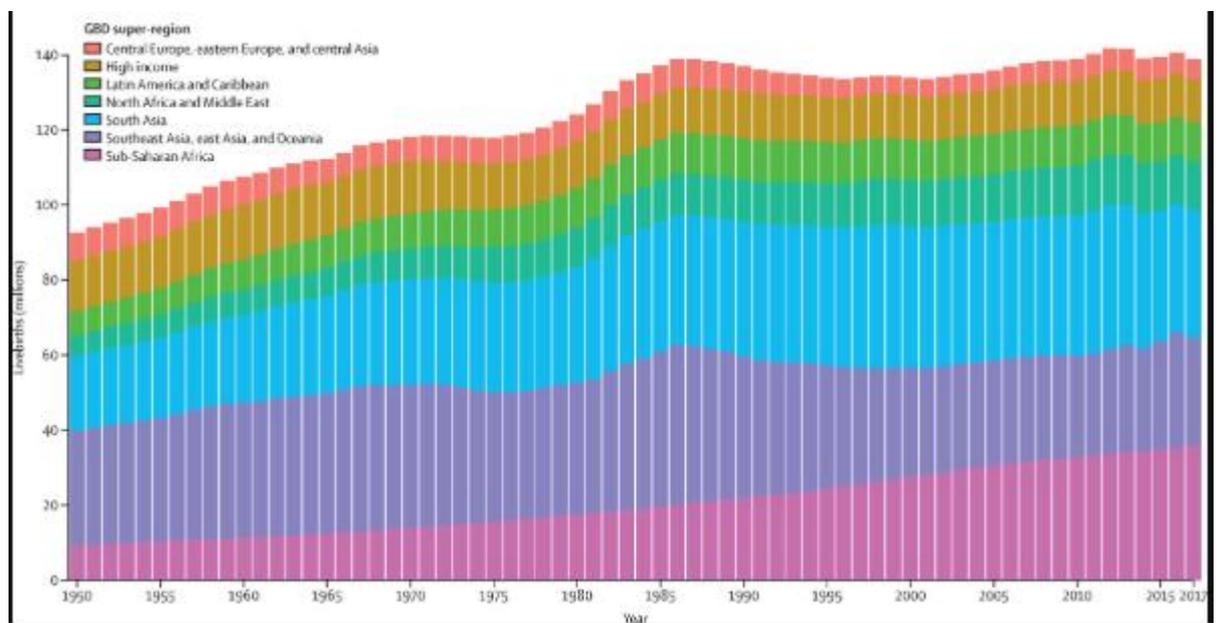


Figure 5. The number of livebirths in different regions since 1950 (Global Health Metrics, 2018)

Regions like Sub-Saharan Africa in particular need help, awareness and monetary support, in order to face high fertility rates in addition to an unmet need in education

and contraception. Essentially, the claim made by Lomborg is that in areas of high fertility and growing population we should prioritize the acceleration and "...the implementation of universal access to quality, accessible, affordable, and comprehensive sexual and reproductive information, education, services, and supplies across the life cycle (Lomborg, 376)." This is, in fact, consistent with SDG 3.7 which proposes: by 2030 universal access to reproductive health (UN, 2019). Moreover, MDG 5 proposes universal access to reproductive health (WHO, 2019).

This assertion is then represented in a cost-benefit analysis of family planning. Family planning is a public health advancement of the last century. It helps in empowering women to make better decisions when or even whether to have children and it decreases the number of unintended pregnancies plus it reduces infant and maternal mortality. Furthermore, it helps women's opportunities educationally and economically and leads to not just healthier families but also healthy communities. It is a smart and practical component of global health and sustainable development (Gates Foundation, 2019).

Based on Table 1, Lomborg ascertains that the amount of benefit and return that expanding access to sexual and reproductive health (SRH) is likely to be large; with a proposed stronger focus on the unmet need for contraception.

Table 1. A summary of costs, benefits, and benefit-cost ratios (BCR) for voluntary family planning programs (Lomborg, 2018: 377).

Annual net benefits and costs (3% discount rate)		Annual benefits	Annual costs of satisfying unmet need in developing countries	
Benefit Component:	Assumptions	Billion USD	Billion USD	BCR
Reduce infant and maternal mortality	Low (DALY = 1K)	110	3.6	30
	High (DALY = 5K)	180		50

Income growth	Low	216	3.6	60
	High	360		100
Total, family planning programs (sum)	Low	326	3.6	90
	High	470		150

Comparing his calculations to other sources is impossible because no other analysis such as this one has been done; however, data points can be investigated. The claim that Sub-Saharan Africa in particular needs SRH policies is detailed frequently, and represented in Table 2 (represented in a figure see Appendix 2) which is comprised of data independent of Lomborg's work that was collected by the WHO.

Table 2. These numbers reflect the extent to which people in African countries need vital health interventions compared to other randomly selected countries; this is calculated when dividing the amount of people receiving health interventions to that of the amount eligible for or needing a health intervention (WHO, 2015).

	Unmet need for family planning (%)	Contraception Prevalence (%)
Countries within Sub- Saharan Africa	2007-2013	2007-2013
Ghana	37	20
Liberia	36	20
Senegal	29	18
Togo	37	15
Uganda	34	30
Countries outside Sub- Saharan Africa		
Albania	13	69
Colombia	8	79
Egypt	12	60
Mongolia	22	55
Thailand	7	79

The overall number of women with an unmet need is still increasing in absolute numbers today reaching a total of more than 220 million this is stated by other organizations and corroborates Lomborg's data used (Gates Foundation, 2019). One data point that varies from Lomborg's assessment is that which was calculated by Global Health Metrics. They conclude the increase in population each year to be between 79.8-87.5 million (Global Health Metrics, 2018). Whereas, Lomborg's states it to be a 78 million increase annually (Lomborg, 2018: 376). This is not a major difference; Lomborg's estimation is just under Global Health Metrics estimates; nonetheless, it is stated within the text without acknowledging the potential range that annual population increases could fall into. It is important to note whether or not different sources were used by Lomborg, even in comparison to data independent of his work the evidence corroborates that which Lomborg's data and statements conclude, it at least attests to the validity and importance in the claim made for prioritization of universal access to contraception; however, it does not attest to the actual dollar amount resulted from the BCR calculations.

The BCR calculations are then followed by a suggestion to elevate the unmet need to an explicit priority for example "Post-2015 Development Priority 1b: Eliminate unmet need for modern contraception by 2040 (Lomborg, 2018: 377)." This is predicated on the idea that reducing population growth is imperative and the ability for populations to benefit from reduced growth is critically related to reduced fertility, but this is a key factor in sustainable development and undeniably population size has a substantial consequence on every aspect of national economies in addition to determining national planning needs (Global Health Metrics, 2018). By understanding the unmet need for contraception, we can then make better use of our efforts and create better policies that will allow us to overcome population dynamics instead of letting them continue to hinder development negatively. Prioritizing the issue of SRH and especially the unmet need for contraception would help in many other sustainable development issues and would result in a large positive amount of benefit for our efforts and a high amount of return for every dollar spent.

Clearly, sustainable development needs more emphasis given to the population dynamics and, as established by Lomborg, the issue of universal access to contraception should sit as a higher priority. Although the actual dollar amount concluded from the cost-benefit analysis could be debated, the data and trends from other independent sources agree with the verdict that access to contraception requires much more support. It is most likely that decreases in global mortality coupled with increases in longevity and population momentum will cause the population to grow for the next coming decades at a rate higher than ideal. By increasing universal access to sexual and reproductive health services and eliminating the unmet need for contraception quicker, we decrease the chances of a future with exponentially more people while simultaneously helping in every aspect of sustainable development though mostly related to child mortality, maternal mortality, poverty. Further understanding of other population dynamics would be of help too as national demographic trajectories have become much more diverse in the 21st century. Single-handedly the population dynamic that would create the most benefit if pursued would be in access to contraception, but contraception initiatives are the answer to the more impoverished high fertility regions mainly. Other helpful pursuits would be to tackle the dynamics of rapid population aging in wealthier low fertility regions. Reducing migration barriers would also be useful, and all of these together would be incredibly beneficial. These all tie back to the idea that population is a major decider in other sustainable goals and prioritization of it, especially the reduction of high fertility, therefore, less future unstable growth, is of the utmost importance.

5 Conclusion

The best definition of sustainable development stands as what was originally said by the UN, simply put: present needs must not compromise the future generation's needs. Yet, tackling anything of this magnitude with its infinite variables is no easy task. Not enough has been done in the past because we want to accomplish all the goals at once; therefore, accomplishing little at all. The current UN sustainable development goals are an attempt at creating a better tomorrow, but these goals fall victim to the same fate of too much ambition and little focus. We are faced with many big challenges when it

comes to shaping sustainable development. One such big challenge is in the lack of structure be it relevant indicators, usable tools, or standardized framework, and therefore a continual inability to unanimously agree will remain while the number of goals will never become condensed enough. This too is in unison with a lack of homogenous scaling from local, regional, and global groups or organizations. The failure to scale information properly calls for more organizational improvements; however, it would be possible to come to an agreement if we attempt to arrange what is most beneficial creating a better set of goals. Prioritization of certain goals, although difficult, first is a smart approach to this conundrum. Rank-ordering the sustainable development issues would allow us to give the proper support to problems that would provide us with a better return.

The whole premise of Lomborg's recent collaborative effort, *Prioritizing Development*, rests on the use of a cost-benefit analysis, calculated with the help of disability life adjusted years, to rank-order a new set of sustainable development goals. In the past Lomborg's work was heavily criticized; most of the complaints were directed at possible problems in data collection and a lack of inclusion of different viewpoints. The subsequent investigation went into determining if the claims presented in his new work fell victim to the same shortcomings. Considering the enormous amount of commitment and time it would take to examine each and every point made in the rank-order, the emphasis was put on one of the prioritized issues. In order to gain a better understanding of the cost-benefit figure presented by Lomborg, therefore his credibility, picking an issue that was high on the list and comparable was crucial. The first non-trade related priority was universal access to contraception. With more investigation into contraception in both Lomborg's words and through other sources, a more in-depth understanding was obtained. The statements, data, and claims made from Lomborg in comparison to the UN, WHO, The Lancet, and Gates Foundation showed mostly similarities. The past complaints made towards Lomborg did not hold up in this case. Furthermore, contraception, as evidently supported by all sources, was of the utmost importance and would create great benefit, which calls for more support.

In examining sustainable development, several walls blocked and therefore molded the progression of the research. There was a rigidity that came with the topic, such as no

universal indicators, framework, and scaling, as mentioned earlier making it harder triangulate meaning. Additionally, although the data that was compiled to make the claim that universal access to contraception was a severe sustainable development problem, and should, therefore, sit as a higher priority, was investigable; nevertheless, there was no way to truly compare Lomborg's dollar amount in his cost-benefit analysis because nothing else came in comparison to it. Another challenge was due to the time constraints; if there were more time to investigate Lomborg's rank-ordering of issues then it would have been more conclusive in determining if and when his claims were credible.

Reflecting on the process, through deep investigation, many insights were gained. The literature surrounding sustainability goes on and on but analyzing prioritization set course for an interesting research path. Much what has been learned is that sustainable development is more complicated than one might think, requires a lot of research into different topics, and it often results in no real agreements or even compromises being made. Moreover, the number of variables is staggering, and the relationship between different sustainable issues can be deeply connected in unimaginable ways.

Good intentions and bad ideas will set us back in our quest to become sustainable. A better way to tackle this quest, and to have the most significant positive impact towards the world we want, would be to prioritize the best goals, concentrate our efforts and funding towards them, instead of accepting too many thus spreading the support out too thin. Nonetheless, focusing on certain goals over others can be difficult, but by not doing it we end up achieving less. Indeed, the worst decision would be to implement a long-term radical sacrifice; it would be much harder to calculate the cumulative impact of that type of decision or in other words would result in a higher margin of error. We could spend a lot less money while also generating incredible benefit by devoting support towards human capital and population-related development; most crucially this could be done by increasing SRH services and education which could accomplish both, but also by decreasing: child mortality, malnutrition. Investing in people is one of the smartest short-term oriented sustainable development decisions to make. In prioritizing an increase towards human capital, primarily through universal access to contraception, we create both more economically productive people and better problem solvers while

simultaneously decreasing fertility rates, therefore, reducing rapid growth rates in population; which is a smart challenge to tackle as it creates a tremendous positive impact for all things categorized under sustainable development hence in our quest to become more sustainable.

References

- Abel, G.J. Barakat, B. Samir, K.C. and Lutz, W. 2016. "Meeting the Sustainable Development Goals leads to lower world population growth.", *Proceedings of the National Academy of Sciences*, 113(50), pp.14294-14299.
- Ajishnu, R. Kousik, P. 2019. "Analysing progress of sustainable development goal 6 in India: Past, present, and future.", *Journal of Environmental Management*, vol. 232, pp. 1049-1065.
- Bulkeley, H. Jordan, A. Perkins, R. Selin, H. 2013. "Governing Sustainability: Rio+20 and the Road Beyond.", *Environment and Planning C: Government and Policy*, vol. 31, pp. 958-970.
- Church, R. 2001. The Effective Use of Secondary Data. [online] Brown.edu. Available at: <https://www.brown.edu/Research/Timelab/archive/Pdf/2002-02.pdf> [Accessed 13 Apr. 2019].
- Club of Rome. 2019. "About Us.", [online] clubofrome.org. Available at: <https://www.clubofrome.org/about-us/history/>. [Accessed 25 Apr. 2019].
- Collis, J. & Hussey, R. 2014. *Business research: a practical guide for undergraduate & postgraduate students*, Fourth edn, Palgrave Macmillan, Basingstoke.
- Davidoff, F. 2019. "Understanding contexts: how explanatory theories can help", *IMPLEMENTATION SCIENCE*, vol. 14, no. 1, pp. 1-9.
- Doukas, H.C. Andreas, B.M. & Psarras, J.E. 2007. "Multi-criteria decision aid for the formulation of sustainable technological energy priorities using linguistic variables", *European Journal of Operational Research*, vol. 182, no. 2, pp. 844-855.
- Dudovskiy, J. 2017. "Interpretivism (interpretivist) Research Philosophy", [online] *Research-Methodology*. Available at: <https://research-methodology.net/research-philosophy/interpretivism/> [Accessed 12 Apr. 2019].
- Forbes. 2019. "Our Favorite Sustainable Brands To Support On Earth Day", [online] forbes.com. Available at: <https://www.forbes.com/sites/forbes-finds/2019/04/22/best-sustainable-brands-earth-day/#350e34803065>. [Accessed 25 Apr. 2019].
- Friel, H. 2010. *The Lomborg Deception: Setting the Record Straight About Global Warming*. Yale University Press, New Haven.
- Gates Foundation. 2019. "Family Planning Strategy Overview." [online]. *Bill & Melinda Gates Foundation*. Available at: <https://www.gatesfoundation.org/What-We-Do/Global-Development/Family-Planning>. [Accessed 19 Apr. 2019].
- Global Health Metrics. 2018. "Population and fertility by age and sex for 195 countries and territories, 1950–2017: a systematic analysis for the Global Burden of Disease Study 2017." *The Lancet*. vol. 392, pp. 1995-2051.

- Hák, T. Janoušková, S. Moldan, B. 2016. "Sustainable Development Goals: A need for relevant indicators.", *Ecological Indicators*, vol. 60, pp. 565-573.
- Hjorth, P. Bagheri, A. 2006. "Navigating towards sustainable development: A system dynamics approach", *Futures*, vol. 38, no. 1, pp. 74-92.
- IOM. 2013. "Population Dynamics in the Post-2015 Development Agenda." *International Organization for Migration*. [online] Available at: <https://www.iom.int/files/live/sites/iom/files/What-We-Do/docs/Outcome-Report-Pop-dynamic-and-post-2015-dev-agenda-14-March-2013.pdf>. [Accessed 19 Apr. 2019].
- Katewillis.co.uk. 2009. Introduction to qualitative market research, pros and cons, ideas for marketing or creative teams, understanding audience motivations. [online] Available at: http://www.katewillis.co.uk/articles/2009/qualitative_research.htm [Accessed 12 Apr. 2019].
- Kohler, H P. 2013. "Population growth", *Global Problems, Smart Solutions*. Cambridge, MA: Cambridge University Press.
- Kohler, H.P. Berhman, J.R. 2014. "Benefits and Costs of the Population and Demography Targets for the Post-2015 Development Agenda.", [online]. *Copenhagen Consensus*. Available at: https://www.copenhagenconsensus.com/sites/default/files/population_assessment_-_kohler_behrman_0.pdf. [Accessed 19 Apr. 2019].
- Lawhon, M. Patel, Z. 2013. "Scalar politics and local sustainability: rethinking governance and justice in an era of political and environmental change.", *Environment and Planning C: Government and Policy*, vol. 31, pp. 1048-1062.
- Lomborg, B. 2018. *Prioritizing Development A Cost Benefit Analysis of the United Nations' Sustainable Development Goals*, University Printing House, Cambridge.
- Lorek, S. Spangenberg, J. H. 2014. "Sustainable consumption within a sustainable economy – beyond green growth and green economies.", *Journal of Cleaner Production*, vol. 63, pp. 33-44.
- Maxwell, S.L. Milner-Gulland, E.J. Jones, J.P. Knight, A.T. Bunnefeld, N. Nuno, A. Bal, P. Earle, S. Watson, J.E. and Rhodes, J.R. 2015. "Being smart about SMART environmental targets", *Science*, 347(6226), pp.1075-1076.
- Meadows, D.H. 1998. *Indicators and information systems for sustainable development*. The Sustainability Institute. Hartland Four Corners VT.
- Mishan, E.J. Quah, E. 2007. *Cost Benefit Analysis: Financial and Economic Appraisal*. London: Routledge. 5th Edition.
- Murray, C.J.L. Acharya, A.K. 1997. "Understanding DALYs", *Journal of Health Economics*. vol. 16. pp. 703-730.
- Parks, R. 2014. "The Rise, Critique and Persistence of the DALY in Global Health.", *The Journal of Global Health*. [online] ghjournal.org. Available at:

<https://www.ghjournal.org/the-rise-critique-and-persistence-of-the-daly-in-global-health/>. [Accessed 6 Mar. 2019].

Pintér, L. Hardi, P. Martin, A. Hall, J. 2012. "Bellagio STAMP: Principles for sustainability assessment and measurement.", *Ecological Indicators*. vol. 15. pp. 20-28.

Post-2015 Consensus. 2015. "The Nobel Laureates' Guide to the Smartest Targets for the World 2016-2030." *Copenhagen Consensus*. [online] Available at: <https://www.copenhagenconsensus.com/post-2015-consensus>. [Accessed 19 Apr. 2019].

Roser, M. Ritchie, H. 2016. "Burden of Disease", *Our World in Data*. [online] ourworldindata.org. Available at: <https://ourworldindata.org/burden-of-disease>. [Accessed 6 Mar. 2019].

Schnaiberg, A. Pellow, D.N. 2002. "The treadmill of production and the environmental state", *The Environmental State under Pressure*, Elsevier Science, Amsterdam pp. 15-32

Schneider, S. 2001. "Hostile climate.", *Grist Magazine*. 12

Schneider, S. 2002. "Global warming: neglecting the complexities.", *Scientific American*. pp.62-65.

Silverman, D. 2014. *Interpreting qualitative data*. Fifth edn. SAGE Publications, London.

Stone, R. 2001. "When facts become an endangered species", *A Journal of Public Policy and Ideas*, 17(4), pp.49.

TIME. 2019. "At What Point Should You Start Really Freaking Out About Climate Change? Right Now", [online] time.com. Available at: <http://time.com/5575658/bill-mckibben-climate-change-falter/>. [Accessed 25 Apr. 2019].

The Ocean Cleanup. 2019. "About", [online] theoceancleanup.com. Available at: <https://www.theoceancleanup.com/about>. [Accessed 24 Apr. 2019].

UN. 1987. Report of the World Commission on Environment and Development: Our Common Future. [online] un-documents.net. Available at: <http://www.un-documents.net/our-common-future.pdf>. [Accessed 6 Mar. 2019].

UN. 2013. "World Contraceptive Patterns 2013." [online]. *United Nations*. Available at: <https://www.un.org/en/development/desa/population/publications/pdf/family/worldContraceptivePatternsWallChart2013.pdf>. [Accessed 19 Apr. 2019].

UN. 2019. "Sustainable Development Goals." [online]. *United Nations*. Available at: <https://www.un.org/sustainabledevelopment/health/>. [Accessed 19 Apr. 2019].

US Census Bureau. 2019. "U.S. and World Population Clock." *US Department of Commerce*. [online] Available at: <https://www.census.gov/popclock/>. [Accessed 19 Apr. 2019].

van den Bergh, J.C. 2010. "An assessment of Lomborg's The Skeptical Environmentalist and the ensuing debate", *Journal of Integrative Environmental Sciences*, 7(1), pp.23-52.

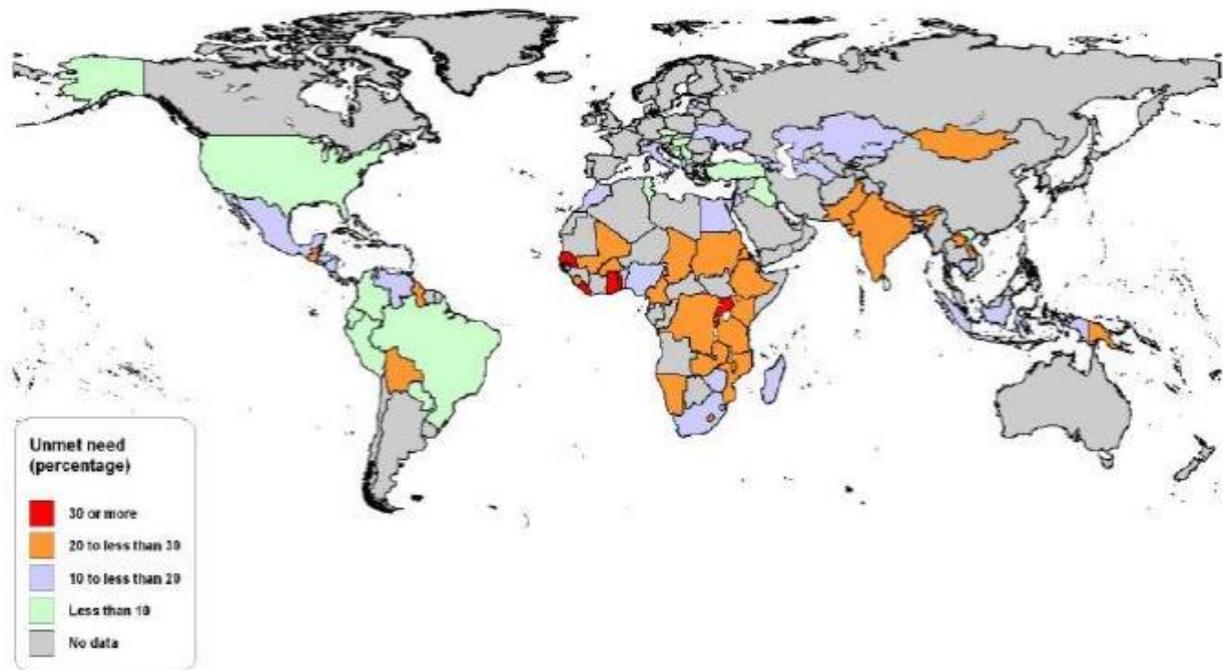
Warms, R. L. and McGee, R. J. 2013. *Theory in Social and Cultural Anthropology: An Encyclopedia*. Thousand Oaks, California: SAGE Publications, Inc.

Weise, E. 2019. "Scientists want to help save the Earth by storing carbon dioxide in the ground", [online] *usatoday.com*. Available at: <https://eu.usatoday.com/story/news/2019/02/28/does-carbon-tax-credit-hold-key-fixing-climate-change/2589582002/>. [Accessed 20 Apr. 2019].

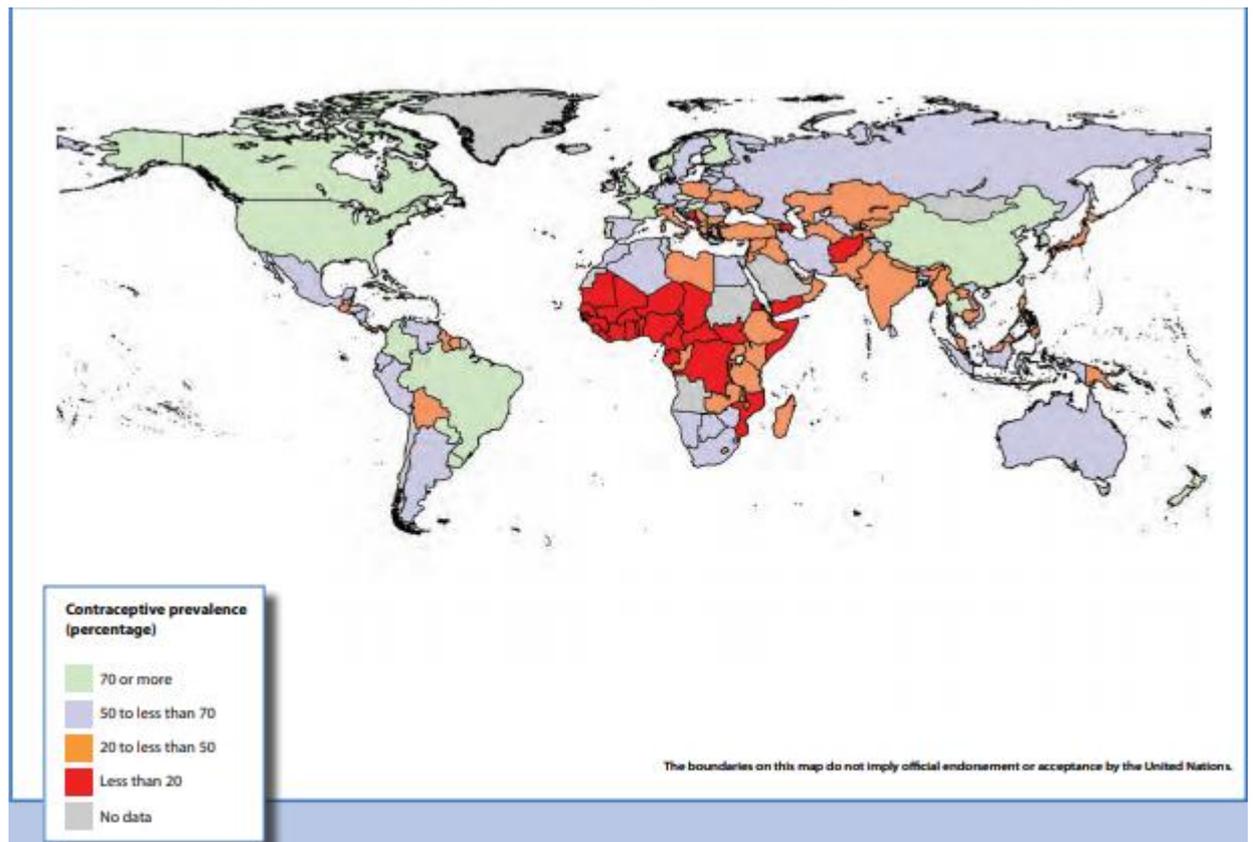
WHO. 2015. "Health Service Coverage." [online]. *World Health Organization*. Available at: <https://www.who.int/reproductivehealth/topics/mdgs/health-service-coverage2015.pdf>. [Accessed 19 Apr. 2019]

WHO. 2019. Health Statistics and Information Systems. [online] *World Health Organization*. Available at: https://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/. [Accessed 6 Mar. 2019].

Unmet Need for Contraception and Contraception Prevalence



This figure indicates the percentage of women with an unmet need for family planning (United Nations, 2013 cited in Kohler & Berman, 2014).



The percentage of those aged 15-49 in union or married that use modern contraception (UN, 2013).

Lomborg's ordering of the most beneficial priorities in the area of population

Priority	Approximate benefit-cost ratio (BCR) in USD billion
Priorities with high benefit-cost ratios	
Achieving universal access to sexual and reproductive health (SRH) services by 2030, and eliminating unmet need for modern contraception by 2040	Greater than 90
Reducing barriers to migration within low- and middle-income countries, as well as between low- and middle-income countries and high-income countries	Greater than 45
Priorities with probably high, but difficult to quantify, benefit-cost ratios	
Elimination of age-based eligibility criteria for retirement, and the development of public pension systems that are based on expected years of remaining life	High, but difficult to quantify
Programs facilitating more efficient and more equitable urbanization	High, but difficult to quantify
Priorities with relatively low benefit-cost ratios	
Maintenance and expansion of public pension eligibility	Low, but difficult to quantify
Family policies aimed at increasing low fertility in high-income countries	Low, and most likely less than 1 due to the limited effects of most policy interventions, but difficult to quantify in general

In relationship to Table 2, 90 represents the lower expected dollar return accumulated by achieving universal access to SRH services but still shows how it would be the most significant priority. Additionally, it shows a greater view on all the population dynamics and exactly how Lomborg would rank their importance (Lomborg, 2018: 390).

Details of the Benefit Cost Calculations

The following connections were made in the creation of Lomborg's benefit-cost calculations, referred to as the project.

Overview

- The benefits are simply the sum of the present discounted values of the weighted impacts of the interventions. Likewise, the costs are simply the sum of the present discounted values of the real resource costs of the intervention (Kohler & Berhman, 2014: 30).
- Policies targeting population dynamics are likely to have a range of impacts. On the micro-level, these impacts are potentially incurred by individuals, their families, and their offspring and/or parents. On the macro-level, these impacts may include economic development, which we will consider as part of the assessments in this paper, but also aspects such as climate change, political instability and conflict, which are not considered here due the lack of detailed empirical studies that could inform benefit-cost evaluations in these domains (Kohler & Berhman, 2014: 31).
- What prices should be used. For example, should prices (including wages) be used for a poor Sub-Saharan African developing country or for Denmark—under the argument that a life should be valued the same whether it be in a low- or a high-income country? How these questions are answered can make an enormous difference for the present project in which averted mortality is a major impact (Kohler & Berhman, 2014: 31).
- All of the Assessment Papers are using the same two alternatives—DALYS of \$1,000 per year and \$5,000 per year—to assure consistency within the project with regard to this critical assumption (Kohler & Berhman, 2014: 31).
- There is a lack of agreement about what discount rates are appropriate, though rates in the 3%–10% range are common for the social sectors. For the present project, all of the Assessment Papers are using the same two alternatives—discount rates of 3% per year and 5% per year—to assure consistency within the project with regard to this critical assumption (Kohler & Berhman, 2014: 32).

Costs

- Given the need to expand health systems and related infrastructures, the costs of expanding access to family planning per additional user are thought to exceed—at least in the short- to medium term—the average costs per current user in SSA contexts (Kohler, 2013: 57).
- Arguably most useful for the present benefit-cost calculations are estimates of the family planning costs related to attaining the UN population forecasts , which suggest that a reduction in the SSA population growth rate by 1

percentage point during 2005–50 would entail discounted family planning costs in the order of magnitude of about \$27 billion (or about 3% of current SSA GDP) (Kohler, 2013:57).

Benefits

- First, benefits that result from the fact that family planning programs may reduce expenditures on social programs as a result of a less rapidly growing size of birth cohorts, with savings including a reduced need for expanding the school system, providing education, implementing immunization programs or providing health care for children (Kohler, 2013: 57).
- Second, benefits of family planning programs occur because reduced fertility, increased child spacing and possible reductions in unwanted fertility are likely to reduce both infant and maternal mortality (Kohler, 2013:58).
- Third, our analyses have emphasized that family planning programs—in addition to reducing fertility and, related, maternal and child mortality—are likely to result in higher levels of female education, improvements in women’s general health, increases in female labor force participation and earnings, increased child health (up and beyond the effect on reducing child mortality) and increased child human capital (Kohler, 2013:58).
- Fourth, and finally, benefits of large-scale family planning programs may result from changes in population dynamics, and in particular, from reductions in population growth rates, increases in the proportion of the population at working ages, and increases in levels of human capital and female labor force participation that result from reduced fertility over the next decades (Kohler, 2013:58).