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Population Growth vs Consumption Growth: A call for Greener energy consumption and optimal population growth

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Abstract: *Environmental degradation is no more a myth, and the consequences are being felt everywhere. We are inconsiderably killing wildlife, polluting the air, cutting down trees, exploiting the soil, spilling toxic waste in the ocean and in return, we are calling it economic growth. It is a crucial topic in discussion amongst ecologist, biologists and environmentalists who rather failed to get an ear from the politicians, industrialists, and global political leaders. With the world population gradually heading towards a standstill, it will eventually come down to governments and their control over the consumption fetishism of its population, however big or small that might be. The unfolding calamity demands a rigorous reformative response. The article realizes that, between population growth and consumption growth, there has to be a neat balance of optimal population growth for younger human resource who will contribute to development, while at the same, an appropriate development strategy to reduce CO2 emission through an environment friendly green energy policy. The power sector is a significant source and an inevitable requirement for development; hence it cannot be omitted from the picture, neither can the necessity of a healthy and self-sustaining environment.*

Keywords: *Population Growth, CO2 consumption , energy sector, green energy.*

Introduction

Environmental degradation is no more a myth, and the consequences are being felt everywhere. We are inconsiderably killing wildlife, polluting the air, cutting down trees, exploiting the soil, spilling toxic waste in the ocean and in return, we are calling it economic growth. It is a crucial topic in discussion amongst ecologist, biologists and environmentalists who rather failed to get an ear from the politicians, industrialists, and global political leaders.

While this chaos took the better of us with not a second to spare, a viral disease trapped us all inside our houses, where we are left to ponder what triggered it? One might recall what Malthus in his infamous proposition, predicted that

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overpopulation will lead to catastrophe. If not a famine, what we are facing now is no less than an environmental catastrophe, only this time, unlike Malthus's assumption, people from all walks of life, rich and poor are equally under threat and this time, the blame cannot be entirely put on population only. The debate of population versus consumption becomes real now, more than ever. So, what is causing such environmental stress, is it the population growth or the consumption growth?

Bangladesh, a country, with a population of 160 million on a land of 147,570 sq kms is growing at an unprecedented rate with 8.20 GDP growth as of 2019.(World Bank country profile Bangladesh 2021) The most recent data shows CO2 emissions from electricity production for Bangladesh in 2014 was 52.8 %. (Bangladesh CO2 emissions from electricity production (%), 1960-2020 - knoema.com, 2021)

Drawing upon the case of a developing country Bangladesh, this paper looked into the population growth and CO2 consumption of Bangladesh in the past, and concludes that, with the existent trend of population growth rate growing down, it will come down to the consumption growth of the people as to how and whether the environmental degradation that is evident in the country can be countered sustainably.

Background of the study

Dr. Norman Borlaug in his Nobel Prize acceptance speech of 1970 remarked that the next 4 billion people of the world, will differ from the previous 4 billion that inhabited it. Keeping aside the difference of race, region, religion; people differ from each other in their consumption choices which is transforming drastically with time. Therefore, a growing population is not only a matter of the increasing heads on the heart of mother earth but also increasing consumption, which is creating havoc on nature, climate, ecosystems, and the environment altogether. This leads us to an interminable and inconclusive population versus consumption debate which seeks to pin down which exactly is destroying our environment.

Recently, there has been an effort worldwide to reduce carbon footprint and lower the CO2 emission per capita. The year 2018 had the highest level of CO2 emission in the air and it had risen 2.7% more in comparing to 2017. The energy sector of the world itself produced 33.1 GT of world's CO2 and hence, making electricity generation the leading source of emissions (IEA Global Energy and CO2 status report, 2019)

Reduced fertility rate and the diminishing population growth rate have almost been achieved due to development, modernization, and economic progress. However, the same is sho¬¬ving the world towards an induced consumption practice that is growing uncontrollably fast! Despite population growth rate being addressed and

reduced over the years, CO2 emission is rising uncontrollably, which points figures on our consumption choices.

The paper argues that, in the coming future, even if population growth is brought under control, the consumption growth might be difficult to tame with capitalism luring the world. And as long as we don't address the problem of consumption growth, our climate is in the face of inevitable devastation.

One of the major sources of CO2 emission is the energy sector worldwide. Regardless, the strong power sector is pre-requirement for development and progress. Hence governments have to choose between balancing a sustained power sector and also a greener power sector. This often becomes difficult for developing countries.

Transitioning to renewable sources for electricity can help reduce greenhouse gas emissions. While the developed world has mostly achieved stability or even reductions in both per capita and total emissions, the blame for increased emission falls on the shoulders of the developing countries of Asia. The developed world is pushing and promoting green energy generation to developing and least developed countries. These countries are mostly at the outset of their development phase and lack resources and expertise to make a major shift to greener energy. Also to be noted is that they contribute very little to the CO2 emission, either in terms of population or consumption, and are, in fact the worse victims of climate change. Being at a precarious and disadvantaged position, these countries are in the constant struggle to juggle between cleaner consumption choices and rapid development requirements. Despite that it is commendable that many of these countries are doing more than most developed one.

Objective of the paper

This papers is a case study on Bangladesh , a country which according to the United Nations Committee for Development Policy (UNCDP), will be formally recognized as a developing country by 2026 (Byron and Mirdha, 2021). This paper seeks to answer the following research question-

1. Is the extensive CO2 emission in Bangladesh caused by its population or the consumption pattern?
2. Energy being the major source of CO2 in the environment but also being a pre requisite for development, what would promote a balanced and sustainable energy sector?

Methodology

This study is based on secondary data which includes rigorous literature review on articles, blogs, proceedings, newspaper articles, and statistics retrieved from country profiles.

Conceptual Framework

In the late 1960s, Malthus's population explosion and population catastrophe and Paul Ehrlich's Population Bomb kindled keen interests and concerns regarding the escalation of population growth all over the world and with that the consequences for natural resources and environmental degradation. It was assumed and accepted that the growing human population, particularly in the developing and least developing countries is responsible for most of the environmental problems (Alberro, 2020).

While countries of the north have already made that transition, most countries of the South are on their course of demographic transition and are exhibiting impressive results compared to the then UK and Europe in their transitioning phases. It took 80 years for developed countries to reduce their birth of 6 children per family to less than three (Alberro, 2020) However, Malaysia and South Africa took just 34 years whereas Bangladesh took 20, and Iran did it in 10! (ibid)

Even countries with the highest population number like china US and India are showing a diminishing growth rate in the coming years. Besides the national policy initiatives to promote family planning and limit childbirth, support the use of contraception, motivate sexual and reproductive health awareness, and education, the constant competition for an improving standard of living is causing this population pause.

The phrase "survival of the fittest" has never been truer as now with people frantically chasing a better life; a better life which is defined by a better job, better house, better luxuries, all of which are leading to bigger and better consumption choices which are not at all befitting for the environment. More significantly, only directing the debate on the number of human populations as the sole reason for environmental crisis will not help the cause, as there is an even bigger imminent problem ahead- the consumption growth (Alberro, 2020). Modern capitalism and its focus on endless growth and profit maximization and accumulation, is leading the world towards an environmental catastrophe through exploitation of nature.

Having explored the current realities on both population and consumption growth, let us now look at some interesting numbers which dictate that, even with lesser population high-income countries that are the core countries have the majority share of the global co2 emission whereas lower-middle-income countries having the majority of the population have an insignificant percentage of the emission of co2.

Table 1. Share of world population and Co2 emission Source: Our world in data

Entity	Share of Global Population %	Share of Consumption based CO2 emission %	Share of Production-based CO2 emission %
High Income countries	16%	46%	39%
Upper middle income	35%	41%	48%
Lower middle income	40%	13%	13%
Low income	9%	0.4%	0.4%

According to 2018 data, North America and China have been accounted for almost half of the global CO2 emissions, making them the planet's top emitters. 50% of the planet's consumption based CO2 emissions is done by world's wealthiest 10 % while the poorest half of the population contributes only 10%. (Alberro, 2020).

Then comes the big fish corporations which continue to exploit the environment for profit maximization. Compared to collective private consumption, the extent of consumption and pollution created by the giant industries is immense. It is suggested that just 20 fossil fuel companies have contributed to one-third of all modern CO_2 emissions, despite industry executives knowing about the science of climate change as early as 1977 (Alberro, 2020).

Blaming the human population in the poorer parts of the world like Asia, Africa, and Latin America might ease the blame game, by displacing it from the powerful industrial countries but will never address the cause of environmental degradation and only worsen it. Thus in the population versus consumption debate, we should shift our focus to consumption now.

Findings and discussion

Right after its Liberation in the year 1971, Bangladesh as a newly sovereign country was faced with a crucial problem of "population explosion". Our father of the nation Bangabandhu Sheikh Mujibur Rahman had addressed the people of this country at Suhrawardy Udyan on 26th March 1975. His words -

"My dear brothers, we should not ignore the fact that our population increases by three million every year. On the other hand, the area of our country is only 55,000 square miles. If our population continues to increase at this rate, there would be no cultivable land left in Bangladesh in 25-30 years, and the people of Bangladesh would be reduced to cannibalizing each other. That is why it is imperative that we control our population growth through family planning." (Bangladesh population policy 2012)

As of 2021, the population density of Bangladesh is 1277.59 per sq. kilometer making Bangladesh the 8th most densely populated country in the world (Bangladesh Population 2021, Demographics, Maps Graphs, 2021).

If not cannibalism, the rather rapid deforestation, depletion of arable land, water air and soil pollution, unavailability of drinking water, malnutrition, insufficient housing, unemployment, malnutrition will take over the country if we don't reform revise and rethink population control.

The table below shows the population growth rate of Bangladesh which was brought under control by 2010. Even though the yearly growth rate hasn't shown drastic change yet the fact that it is still in the reducing trend, is a positive thing to look at.

Table 2. Population growth rate of Bangladesh Source: www.worldometer.com

Year	Yearly % Change(growth)
2020	1.01 %
2019	1.03 %
2018	1.06 %
2017	1.08 %
2016	1.10 %
2015	1.15 %
2010	1.20 %
2005	1.72 %
2000	2.08 %
1995	2.22 %
1990	2.60 %
1985	2.65 %
1980	2.59 %
1975	1.75 %

A futuristic projection into the coming years of the country, shows that with the existing trend of reduced population growth rate will possibly result to a 0.43 by the year 2040 if other factors remain the same.

Table 3. Population forecast of Bangladesh, Source: www.worldometers.com

2025	0.92
2030	0.75
2035	0.59
2040	0.43

Besides many other factors, the strict population policy of Bangladesh can be given credit for the declining population growth, nonetheless such strict policies must also

be reviewed because with times changing, these policies might not remain relevant and far fetching.

The population policy of 1976 had set a demographic target to bring the country's population under control by promoting the family planning program. Population control was deemed as a significant part of national development initiatives back in the 1973 and till date it remains the same. Not only were anti-nationalist policies like 'Not more than two children, one better" were promoted, but also nationwide education and national campaign was introduced to promote smaller families And therefore we witness a major fall in population growth rate from 1.75 in 1975 to 1.01 in 2020.

The most recent population policy is the Bangladesh population policy 2012 which has stern objectives of increasing the contraceptive users to 72% and achieve NRR =1 by the year 2015(Bangladesh population policy, 2012

However, we have two eminent problems at hand.

Given the environmental threat of 11% land loss in the low lying coastal areas by 2050(Environmental Justice Foundation, 2020), we might face a major depletion of land in the coming years. Environmental damage and degradation has become the " new normal" in Bangladesh too. Bangladesh, a delta country has been in susceptible to massive environmental disasters due to the growing global climate change. Because the country is a low-lying one, with a buzzing population density and inadequate infrastructure, global climate change is predicted to have enormous effect on the country and its economy in the coming years.

In the Bay of Bengal, sea surface temperature is increasing and thereby causing stronger cyclones which are pushing water 50 to 60 miles more up the Delta's rivers (Glennon, 2017). Climate change has triggered mass migration in Bangladesh. Around 50,000-200,000 people have been annually displaced in the recent years due to river bank erosion and to think where do all these people migrate to? (Glennon, 2017). Majority of them flock towards Dhaka increasing the density of population in the city. In a study conducted in 2012, it was found that 1500 Bangladeshi families migrate to cities and mainly Dhaka because of the changing environment (Environmental Justice Foundation, 2020).

The statistics below show that, regardless of a declining population rate, the density of population per square kilometers is still increasing which means we are losing land.

Table 4. Year-wise population growth and density in Bangladesh. Source: https://worldpopulationreview.com

Year	Growth Rate	Density (km²)
2021	1.03%	1277.59
2020	1.01%	1265.19
2019	1.03%	1252.56
2018	1.06%	1239.74
2017	1.08%	1226.75
2016	1.10%	1213.62
2015	1.15%	1200.40
2010	1.20%	1133.71
2005	1.72%	1068.11
2000	2.08%	980.70
1995	2.23%	884.77
1990	2.60%	792.59
1985	2.65%	697.27
1980	2.59%	611.81
1975	1.75%	538.27

At the same time, with development, urbanization modernization, consumption patterns are also changing which means, people of these and coming generation consume more and emit more CO2 in the environment, suspecting the environment to more threats of degradation.

This leads us to the next concern of consumption control. The graph given below shows the constant rise in per capita Co2 emission in Bangladesh.

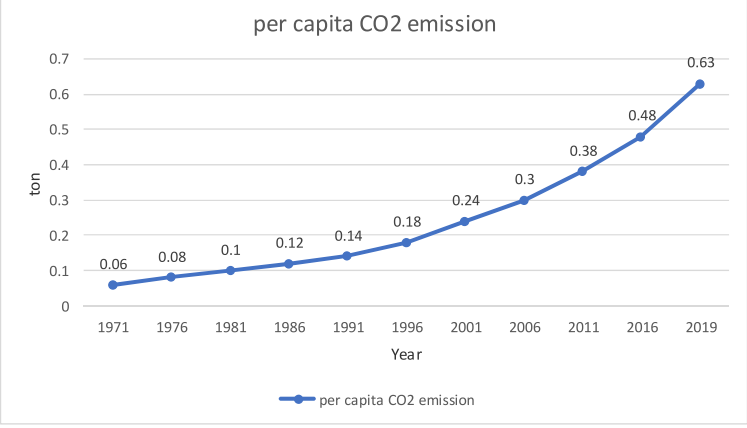

Fig 1. Per capita CO2 emission in Bangladesh

In the year of independence Bangladesh had 0.06t of per capita CO2 emission (Ritchie & Roser, 2020). From 1971 to 1996 Bangladesh didn't have any energy policy for that reason the rate of per capita CO2 emission had increased.

The National Energy Policy (NEP) first appeared in 1995 for overall management of energy in the country and implemented in 1996 when per capita CO2 emission was 0.18t (Ritchie & Roser, 2020). With rapid change of global as well as domestic situation, the policy was updated in 2005. The updated policy included additional objectives namely to ensure environmentally sound sustainable energy development programs causing minimum damage to environment, to encourage public and private sector participation in the development and management of energy sector but the per capita CO2 emission had increased in 2006 and reached 0.3t from 2001 (Ritchie & Roser, 2020). In the mean time in 2003, an impartial energy regulatory commission was formed to regulate the customer rights and also look out any damage of environment via energy like electricity production, gas transmission etc, but with all those efforts the per capita CO2 emission didn't decrease at all. Despite having a renewable energy policy , sustainable and renewable energy development authority (SREDA) ,Atomic Energy Control Act , in 2014 the per capita CO2 emission level increased and reached 0.48t (Ritchie, & Roser, 2020). According the latest data of 2019, the per capita CO2 emission reached all-time highest level of 0.63t and with this rate of increasing the per capita CO2 emission will cross all the previous record which can be a catastrophic for costal country like Bangladesh (Ritchie, & Roser, 2020). In 2021 Bangladesh government under take The National Solar Energy Action plan to address the rapid CO2 emission (Tachev, 2021).

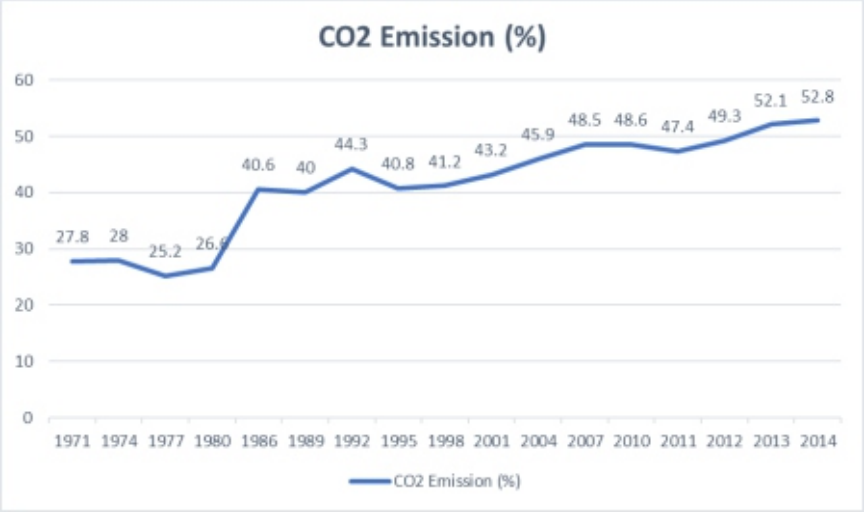

Fig 2. CO2 emissions from electricity production in Bangladesh , knoema.com, 2020)

Bangladesh is a signatory country of the 2015 Paris Agreement and has strategic priorities for the implementation of electric power policies and reforms following the Paris Agreement on climate change. Therefore, Bangladesh has formulated an Energy Sector Master plan which envisages that around 35% of the country's power generation will be from renewable energy sources or clean power imports by 2041, from the current level of 3%. As ambitious as this plan may seem, it is appreciable also. Bangladesh is exploring the renewable sources like solar and wind energy for its foreseeable future.

In order to sustain its recent economic progress, Bangladesh will not only require uninterrupted power supply for its industries and other sectors, but simultaneously need to address the power related hurdles, such as limited availability of service land, vulnerability to climate change, demographic and social change, technological breakthroughs, resource scarcity and so on, in its path to transition (Rashid, 2019). Bangladesh's power sector is growing with a capacity addition which has increased from 5% to 28% from 2012 to 2018 according to the World Bank and the Bangladesh Power Development Board (Rashid, 2019).

Power generation in Bangladesh was done predominantly by natural gas extracted from the country's gas fields. However, with domestic gas reserves depleting and not being enough to meet the growing demands, Bangladesh has expedited efforts to conduct new gas exploration and importing options from other countries. Instantaneously, it endeavored to diversify the fuel-sources for power generation. Although a significant number of key power plants from past days are still running on natural gas, new and refurbished power plants are being moved towards HSFO/Coal/Nuclear and LNG. Quick rental power and Independent Power Producer plants based on HFO became the viable option to meet the overflowing demand of power in a country which is only in its budding years of urbanization and modernization. However, the fact that these power plants are calling havoc on the environment had not escaped the government's concern. The difficult decision of a tradeoff between power demand and environmental concern has always been a critical call. The neoliberal government of Bangladesh had allowed private market to invest in the sector, but, the welfare state had to assure electricity at affordable prices to its people and save the environmental from degradation.

LNG and coal, thereafter, emerged as two promising options for power production. Coal is expected to be the source of 40% of power generation in high demand case and 34% in low demand case. India China Japan and South Korea are some of the countries from which Bangladesh will be importing coal for the Rampal at Rampal (1,320 MW) and at Payra (1,320 MW) in southern Bangladesh. This project brings with it not only benefits of cheaper energy production but also some challenges of its

own, sometimes due to the location of the power plants or the route of coal transportation, which poses great environmental impact for Bangladesh.

Bangladesh is in a fix regarding the energy sector. At one hand, the commitment to battle climate change requires cleaner technology and transition to renewable sources, on the other hand, prerequisite to economic development is meeting growing power demand and supporting industrialization and urbanization with uninterrupted supply at low cost. Bangladesh is a landlocked delta country sharing border with India and Myanmar and has a very hot and humid climate with heavy rainfall and dry summers. From the aspect of geographical characteristics of renewable sources and technical possibilities it is in a disadvantageous position to harness any renewable source to make satisfactory power generation.

Bangladesh having a high density of population will face difficulty in domestic production in large scale. Even at present, with LNG sources in the country depleting and coal not being abundant too, the country is bound to import, which foresees an inevitable dependency of on neighboring country India.

There were also protests against the open pit coal mine in PhulBari region in the northeast of the country, where the locals voiced their concerns over potential destruction of agricultural land and displacement of indigenous communities. Chinese state-owned power and utilities companies have been active in their search for suitable international power utility and grid investment opportunities. The government had suspended plans for the project.

Hence, in every case, the Bangladeshi decision to start developing either a coal based or a imported LNG or renewable source power sector raises grave questions about economic as well as environmental sustainability. These investments will be creating long-term, external financial dependence as well as raising concerns as to the possibility that these plants may become economically unviable as the costs of alternatives falls and climate costs rise.

Results

At present, a country like Bangladesh which is showing commendable growth over the last decade is in a very precarious position. As much as the country requires a strong power sector, it is also in the face of massive environmental impact.

Bangladesh is on the verge of controlling its population growth. However, it is high time for the country to focus on industrialization and modernization in order to strengthen its economy, which means, the country will essentially require younger workforce. Thus policy makers have to look into their development visions from a more predictive and farfetched perspective.

The power sector being a very significant part of progress is one that cannot afford to be compromised. Hence, consumption patterns and choices are at question now and the government is facing difficulty in striking the right balance to ensure a cleaner and greener power sector.

It should not be overlooked that, Bangladesh plays a very small role in the CO2 consumption globally and yet is one of the worst sufferers. Hence, it is only obvious for the country to expect assistance from the affluent countries to help it overcome this precarious situation. In every case, the Bangladeshi decision to start developing either a coal based or a imported LNG or renewable source power sector raises grave questions about economic as well as environmental sustainability. These investments will be creating long-term, external financial dependence as well as raising concerns as to the possibility that these plants may become economically unviable as the costs of alternatives falls and climate costs rise.

Bangladesh being a striving economy is trying its best to balance between demand, diplomacy and dear environment. It is commendable that the country is progressing towards availability and affordability of technology and limited smart grid technologies which would result in a seismic transformation of the industry and assure cleaner energy production. With better transmission lines, power produced can be carried to faraway regions without setting up smaller plants scattered in human localities which will benefit the environment. It has commendably set up individual house based solar grids to power electricity in extremely rural areas where transmission line access hasn't reached yet. Recently, dialogues are underway with the Asian Development Bank (ADB) for financing a 50MW floating solar project in the Kaptai Lake (Moazzem, Dr. Khondokar Golam, and Mohammad Ali, 2019). These energy projects are expected to reduce CO2 emission in the environment. Besides these household practices that produce and emit CO2 must also be checked and scrutinized. The nation as a whole needs to be aware of environmental degradation and the threat to their own lives and move towards greener consumption lifestyle for a sustainable development Bangladesh.

Conclusion

With the world population gradually heading towards a standstill, it will eventually come down to governments and their control over the consumption fetishism of its population, however big or small that might be. Development then will no more mean an effort to bring down the birth or death rate and pursuing economic advancement, rather a collective effort to maintain an optimal growth rate as well as change consumption choices through more environmentally friendly approaches to economic progress. Neither will a critical decline in population growth aid development, nor will a degrading environment. The unfolding calamity demands a

response from the international community. Wealthy countries have generated most of the greenhouse gases that are harming Bangladesh and other developing countries. If the developed and industrialized world is unwilling to accommodates tens of millions of refugees in the distant devastating future, it is high time they cooperate and compensate by assisting the developing countries in every way possible, starting from offering investments into cleaner energy, rehabilitation of climate refugees and displaced population, and controlling their own carbon-based consumption in order to prevent the aggravation of CO2 emission.

The article realizes that, in a world where both population growth and consumption growth are two vital causes of climate change and catastrophic consequences for all, it is difficult to strike a balance and pick one solution. It is puzzling for the least developed countries, which are only at the initial stages of development. While population growth is brought under check, consumption choices are challenging to address and act upon because a country's socio-economic context largely decides so. The power sector is a significant source and an inevitable requirement for development; hence it cannot be omitted from the picture, neither can the necessity of human resource. What is ideal in such a situation for Bangladesh, is to promote a balanced green energy sector and bring the CO2 emission under check. Hence, it is our choices and practices of the present that will shape the future, and it is evident that, we don't simply have to plan our population but also plan our consumption.

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