

Strengthening the Link between Economic Development, Environment and Public Health

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The state of global environment and its impact on public health is closely linked to human activity. For example, the growth in the global human population together with the corresponding economic development necessitates the use of energy at large. This growth has a tremendous impact on the use of fossil fuel. Excessive use of fossil fuel in turn pollutes the environment.

The global human population reached 7.3 billion (1) at 1-2% annual rate of increase in the year (1950-2015) this amounts to an average annual global growth of about 75 million people. Incidentally, this annual addition in population is equivalent to the entire population size of Ethiopia in the year 2005. More than 90% of the population growth takes places in low and middle income countries, with the greatest growth taking place in Sub-Saharan Africa.

Global economic development, however, does not take place proportionately to each country's population growth (2). It should be noted that there are only a few countries in Africa that experience accelerated economic growth. In this regard, Ethiopia is at the forefront in achieving an annual double digit GDP growth over the past decade (2, 3). In fact, it may be encouraging to point out that many African countries appear to be doing better this time than ever before in attracting foreign investment as noted in the 3rd International Conference on Financing for Development held in Addis Ababa in July 13-16 /2015.

Such a positive trend might have arisen partly from the ever increasing population size that could serve both as a source of cheap labor and as an appealing market for manufactured goods. Needless to mention, foreign investment has improved the quality of life in low-to-middle income countries through, for example, creating jobs, improving social services and building infrastructure. In fact, the level of global extreme poverty (i.e., living on less than

US\$ 1.25 per day) has declined from its baseline of 47% in 1990 to 14% in 2015 (4). This accounts for a level of reduction in extreme poverty from 1.9 billion to 0.84 billion population. Obviously, massive urbanization and industrialization are thought to be the results of the global efforts made to produce wealth and achieve economic development on the one hand. On the other hand, however, it is equally important to note the adverse effects of this development endeavor on human health. This means that the benefits of economic development are clear and can easily be understood while the health risks inherent in producing wealth and achieving the desired economic development are either often poorly understood or conveniently overlooked.

The manuscripts published in this special issue provide a systematic review of the current state of the environment in Ethiopia and the links this may have with human health. The reviews in particular focus on the following three main areas.

- indoor and outdoor air pollution
- occupational health and safety, and
- climate change and health.

In addition, gaps in the policy frameworks, and mechanisms for their effective implementation are given due attention in this special issue. Included in the broad areas mentioned as the focuses of the reviews are such cross-cutting issues as lack or insufficiency of:

- local scientific evidence
- research and policy capacity in key areas
- infrastructure for monitoring and evaluating environmental and associated health risks
- co-ordination among stakeholders,

These issues of common concern need to be addressed via concerted and coordinated efforts of academic institutions, government organizations and all other pertinent stakeholders.

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Lessons to be drawn from the review articles are hoped to help us protect the environment and public health and prepare ourselves to address more meaningfully the impacts of climate change on human health.

The establishment of the global environmental and occupational health (GEO Health) Hub for eastern Africa is acclaimed by member countries as a timely development support. The Hub includes countries like Kenya, Rwanda and Uganda. The establishment of the global environmental and occupational health (GEO Health) helps member countries to pool together the meager resources available across the region and develop a coordinated action plan to protect the environment and public health. The proposed focus of the full Hub for eastern Africa (i.e., its focus on the major problem of indoor and outdoor air pollution and health,) in addition to having other activities around occupational health and climate change, is an appropriate tool for development in the region.

The catalysts to the economic development that are currently experienced in Ethiopia are derived from the natural environment that provides us with the required resources such as air, water, food, minerals, oil, energy, etc. As previously observed in the developed world, the interactions between the natural environment and human development activities result in the production of hazardous wastes that could damage the well-being of the entire eco-system, including human being. An emerging example of this in the Ethiopian setting is the rapid increase in the number of vehicles in urban centers such as Addis Ababa. Clearly, the increasing demand in the transportation sector in general has accelerated the use of small and large vehicles in the city. For example, slightly over a half (i.e., 56%) of the total 350,419 vehicles that were in use in Ethiopia in 2010/11 were found in Addis Ababa. Over one-thirds (i.e., 35%) of the vehicles in Addis Ababa in the year under discussion had diesel engine, and about 55% had already been in operation for 20 or more years at the time (5). The growth rate in the number of vehicles in Ethiopia was estimated to be 10% per annum between 1985-1997 (6). Apparently, this rate has increased since then due to the country's economic growth recorded over the last few years. Diesel

engine vehicles and vehicles that have been in operation for a long period of time are likely to emit noxious gases and particulates - thus making urban air a threat to human health. The resultant air pollution is further aggravated by the deteriorating quality of road and poor management of on-road vehicles. Indications that traffic air pollution is increasing raise concerns about human exposures to pollutants emitted from diesel and petrol engines (7-10).

Accelerated urbanization such as is observed in Addis Ababa is likely to worsen water and soil pollution. The solid waste collection service coverage in Addis Ababa, for example, is estimated to be 65 to 80% (11). Casual observation indicates that the uncollected solid waste is either dumped around the banks of streams or is made to freely flow on cross-passing streams. Possibilities are also there for the city residents to observe everyday piles of solid wastes anywhere in the city. A similar concern can be extended to water pollution.

The liquid wastes discharged from industries without treatment is yet another source of pollution in Addis Ababa (12, 13). Wastes discharged from industries often contain heavy metals and organic chemicals that spoil the water eco-system and put human health at risk through the food chain. There is a growing concern that heavy metals are found in surface water, sediments and fish (14-18). The rapid pace of industrialization in Ethiopia (in Addis Ababa, in particular) thus remains to be a health threat if such fatal practices are allowed to continue any longer.

The question about what needs to be done to link development and healthy environment is a complex one to answer as it involves politics, management, economics and social attitudes. Simply put, however, the answer lies in **putting in place and effectively implementing sustainable development policy** (19).

Sustainable development is defined as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (19). As explained below, public health plays salient roles in the management of sustainable development through, for example, using

traditional strategies of prevention of air pollution.

Primary prevention

Primary prevention involves the application of measures and provisions to avoid pollution or significantly reduce the magnitude at the source. Such provisions include waste optimization through waste reduction, recycling, reusing and recovering (commonly called the 4 R's or waste optimization). Waste optimization implies that waste has an economic value that could provide returns. The use of energy sources that are environmentally friendly is part of such a primary prevention strategy. Ethiopia's Climate Resilient Green Energy Initiative is an aspect of a national contribution the country has made in response to the global concern of the effects of climate change on health (20). Initiatives taken towards promoting hybrid vehicle and blending fuel with ethanol (bio-ethanol) and using it can be taken as examples of encouraging moves towards the achievement of clean air on traffic roads.

Putting in place regulations on the sources of pollution and proper enforcement seems to play a critically significant role in at least reducing the extent of environmental pollution. It may be important to note that a regulation that encourages pollution prevention is already in place on the one hand (21-23). On the other hand, however, it is also necessary to point out that further and harder efforts are yet needed to design and put in place effective techniques of implementing the regulations of pollution prevention. Until then, however, it should not sound trivial to state that common sources of pollution such as factories, households, institutions, (and even individuals) must be held accountable for the share they have in polluting the environment.

Secondary Prevention

Secondary prevention generally refers to the application of waste treatment and monitoring before releasing the waste into the environment. This implies that concerned bodies should behave in a manner that is friendly to the environment. The monitoring of the indicators of pollution in reference to the local or international standard values is the basis for the provision of waste discharge permissions. Such

practices are widely used in developed countries where regulatory and institutional frameworks are sufficiently developed. In contrast, poorly organized implementation framework, limited capacity in the tracking of pollution, limited trained human resources and underdeveloped research programs in areas of pollution and health risk characterize the situation in developing countries. Clearly, this appears to be a formidable challenge facing the developing countries in the attempts they make to control pollution

Tertiary prevention

The process of recovering damaged environment and taking it back to its natural baseline state is nearly impossible. The cost associated with the clean-up process and the technological investment required for undertaking it pose tremendous challenges for low-to-middle income countries. Developing countries should thus allow themselves the opportunity to learn from the experience of the developed countries.

In conclusion, we want to breathe clean air, drink safe water, and consume healthy food. Needless to say, this is possible only when sustainable public health actions can be taken. The pieces of information provided here and there in the reviews in this special issue and the plan of action outlined for the new GEO Health Hub for eastern Africa have the potential to make significant contributions towards building our capacity to tackle the environmental and occupational health challenges faced in Ethiopia as well as in the broader eastern African region.

References

1. United Nations. UN Population projection. <http://esa.un.org/unpd/wpp/unpp/p2k0data.asp>.
2. World Bank. World Bank. GDP growth rate (annual %). <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>.
3. Ministry of Finance and Economic Development Ethiopia. Growth and Transformation Plan (GTP) 2010/11-2014/15 2010.
4. United Nations. The Millennium Development Goals Report. http://www.un.org/millenniumgoals/2015_MDG_Report

- [ort/pdf/MDG%202015%20rev%20%28July%201%29.pdf](#). 2015.
5. Redda Daniel. Pilot Global Fuel Economy Initiative study in Ethiopia: Vehicle Stock Statistics Final Draft Report, Addis Ababa Institute of Technology/Federal Transport Authority. 2012.
 6. Temesgen A. The role of the transport sector in Ethiopia's economic development Economic focus Ethiopian Economic Association. 9(4):1-20.
 7. Brandt EB, Biagini Myers JM, Acciani TH, Ryan PH, Sivaprasad U, Ruff B, et al. Exposure to allergen and diesel exhaust particles potentiates secondary allergen-specific memory responses, promoting asthma susceptibility. *The Journal of allergy and clinical immunology*. 2015. Epub 2015/03/10.
 8. Jung DY, Leem JH, Kim HC, Kim JH, Hwang SS, Lee JY, et al. Effect of Traffic-Related Air Pollution on Allergic Disease: Results of the Children's Health and Environmental Research. *Allergy, asthma & immunology research*. 2015;7(4):359-66. Epub 2015/05/06.
 9. Kubesch NJ, de Nazelle A, Westerdahl D, Martinez D, Carrasco-Turigas G, Bouso L, et al. Respiratory and inflammatory responses to short-term exposure to traffic-related air pollution with and without moderate physical activity. *Occupational and environmental medicine*. 2015;72(4):284-93. Epub 2014/12/06.
 10. Weichenthal S, Hatzopoulou M, Goldberg MS. Exposure to traffic-related air pollution during physical activity and acute changes in blood pressure, autonomic and micro-vascular function in women: a cross-over study. *Particle and fibre toxicology*. 2014;11:70. Epub 2014/12/10.
 11. Nigatu Regassa, Rajan D. Sundaraa, Bizunesh Bogale Sebok. Challenges and Opportunities in Municipal Solid Waste Management: The Case of Addis Ababa City, Central Ethiopia. *J Hum Ecol*. 2011;33(3):179-90.
 12. Fesseha Hailu Mekonnen. Liquid waste management: The case of Bahir Dar, Ethiopia. *Ethiop J Health Dev*. 2012;26(1):49-53.
 13. Mulugeta Getu. Ethiopian floriculture and its impact on the environment: Regulation, Supervision and Compliance. *Mizan Law Review*. 2009;3(2):240-70.
 14. Larissa Dsikowitzky, Mesfin Mengesha, Elias Dadebo, Carlos Eduardo Veiga de Carvalho, Sven Sindern. Assessment of heavy metals in water samples and tissues of edible fish species from Awassa and Koka Rift Valley Lakes, Ethiopia. *Environmental Monitoring and Assessment*. 2012;185(4):3117-31.
 15. Zinabu GM, Nicholas JG. Concentrations of heavy metals and related trace elements in some Ethiopian rift-valley lakes and their in-flows *Hydrobiologia*. 2003;492(1-3):171-8.
 16. Yared Beyene, Yoshinori Ikenaka, Aksorn Saengtienchai, Kensuke P. Watanabe, Shouta M. M. Nakayama, Mayumi Ishizuk. Occurrence, distribution, and ecological risk assessment of DDTs and heavy metals in surface sediments from Lake Awassa—Ethiopian Rift Valley Lake Environmental Science and Pollution Research. 2013;20(12):8663-71.
 17. Aklilu A. Heavy metals concentration in tannery effluents associated surface water and soil at Ejersa of East Shoa Ethiopia. *Herald of Journal of Geography and Regional Planning*. 2014;3(3):124-30.
 18. Minhale AS, Yilma SI, Mary K, Dereje HA. Potentially toxic traces elements contamination of the little Akaki River of Addis Ababa, Ethiopia. *Ethiopia Journal of Natural Sciences Research*. 2015;5(1):2224-3186.
 19. Nations U. Sustainable Development: From Brundtland to Rio 2012. 2010.
 20. Federal Democratic Republic of Ethiopia. The path to sustainable development Ethiopia's Climate- Resilient Green Economy Strategy. 2011.
 21. Federal Democratic Republic of Ethiopia. Regulation No 159/2008. Prevention of industrial pollution. 2009.
 22. Federal Democratic Republic of Ethiopia. Proclamation No 300/2002. Environmental pollution control. 2002.
 23. Federal Democratic Republic of Ethiopia. Proclamation No 299/2002. Environmental impact assessment proclamation. 2002.
 24. Paigen B. Controversy at Love Canal. *The Hastings Center report*. 1982;12(3):29-37. Epub 1982/06/01.