

On the Context of Diabetes: A Brief Discussion on the Novel Ethical Issues of Non-communicable Diseases

Prasasti Pandit^{1,*}

¹Department of Philosophy, University of Rhode Island, Kingston, United States of America.
prasasti.pandit@uri.edu¹

Abstract: The primary goal of this article is to explore whether there are any specific ethical issues raised by public health interventions to prevent diabetes. Diabetes is invoking an increasingly high disease burden on global health and becoming a critical threat to economic and social development worldwide. This paper starts with a general idea and types of diabetes. Then it exhibits some reports which show clear evidence that diabetes is currently a worldwide threat to public health. After that, this paper dedicates to exploring the novel ethical dilemmas raised by the preventive public health measures for diabetes. This work also highlights that incorporating bioethical principles such as justice, beneficence, non-maleficence, and autonomy are missing in the prevention methods of diabetes. Here it attempts to point out that without resolving the ethical dilemmas, preventive health programs are not worth effective implantation and consequently fail to provide people with a healthy life. It also categorizes some ethical distinctions of diabetes as a non-communicable disease with infectious disease ethics. Finally, it critically analyses the adopted public health standards to consider whether these raise any specific ethical dilemmas. This paper concludes with some suggestions to resolve these dilemmas.

Keywords: Diabetes; Economic and Social Development; Public Health; Global Health; Preventive Measures; Justice; Beneficence; Non-maleficence; Autonomy; Social Determinants.

Received on: 15/10/2022, **Revised on:** 21/11/2022, **Accepted on:** 25/01/2023, **Published on:** 05/03/2023

Cite as: P. Pandit, "On the Context of Diabetes: A Brief Discussion on the Novel Ethical Issues of Non-communicable Diseases," *FMDB Transactions on Sustainable Health Science Letters*, vol. 1, no. 1, pp. 11–20, 2023.

Copyright © 2023 P. Pandit, licensed to Fernando Martins De Bulhão (FMDB) Publishing Company. This is an open access article distributed under [CC BY-NC-SA 4.0](#), which permits copying, remixing, redistributing, transformation, and building upon the material in any medium so long as the original work is properly cited.

1. Introduction

Chronic hyperglycemia and changes in carbohydrate, lipid, and protein metabolism due to deficiencies in insulin production, insulin action, or both characterise diabetes mellitus, a metabolic illness with numerous etiologies. Long-term complications of diabetes mellitus include organ malfunction and even failure [10]. Type 2 diabetes is characterised by either insufficient insulin production by the pancreas or inefficient insulin utilisation by the organism. Blood sugar levels are controlled by the hormone insulin. Long-term damage to numerous bodily systems, including the nerves and blood vessels [11] and kidneys, occurs as a result of hyperglycemia, or elevated blood sugar, which is a common result of uncontrolled diabetes.

1.1. Primarily there are four types of diabetes recognized by physicians [12]

Type 1 diabetes, formerly identified as insulin-dependent, juvenile or childhood-onset, is characterized by deficient insulin production and requires daily insulin administration. The cause of this diabetes remains unknown till now. However, physicians address some symptoms of this diabetes, which may arise suddenly in affected patients, i.e., excessive excretion of urine (polyuria), thirst (polydipsia), constant hunger (polyphagia), weight loss, vision changes, and fatigue [12].

*Corresponding author.

Type 2 diabetes, previously known as non-insulin-dependent or adult-onset, occurs due to the body's ineffective use of insulin. Symptoms are similar to Type 1 diabetes. Type 2 diabetes embraces 90% of people with diabetes worldwide and is largely the cause of excess body weight and physical inactivity [11]. This type of diabetes affects not only adults but also preys upon children worldwide [11].

Gestational diabetes is known as hyperglycaemia and is first diagnosed during pregnancy. Symptoms of this diabetes are similar to Type 2 diabetes, and Gestational diabetes is usually diagnosed by prenatal screening rather than reported symptoms [11]. Impaired Glucose Tolerance (IGT) and Impaired Fasting Glycaemia (IFG) are intermediate conditions in the shift between normalcy and diabetes. Although it is not unavoidable that patients affected with IGT or IFG are highly susceptible to type 2 diabetes [11]. There are many dreadful consequences of diabetes, including high morbidity and mortality rates worldwide. WHO [12] has mentioned some of the major concerns of diabetes. Diabetes harms blood vessels, eyes, kidneys, nerves, and eventually the heart by increasing the rate to 50% of heart attacks among diabetes patients. It leads to nerve damage and reduces blood flow in the limb.

Further infection and ulcer deteriorate the situation, and finally, the possibility of limb amputation increases. Diabetic retinopathy is a major cause of an important cause of global blindness as it damages retina blood vessels. It is also a primary cause of kidney failure.

2. Review of Literature

According to the survey report 2013 [18], around 382 million people have diabetes, with the prediction that by 2035 it will reach 592 million. Among them, 80% of cases of type 2 diabetes-affected people are from low and middle-income countries. Likewise, the average age boundary for diabetes-affected people is between 40 and 59. The shocking part is that 175 million people with diabetes are still undiagnosed, while around 5.1 million deaths happened in 2013, i.e., every six seconds, a person dies from diabetes. Not only affecting 21 million births during pregnancy, type 1 diabetes now spreading among 79000 children in 2013. Approximately 548 billion dollars were spent on preventing this deadly disease in 2013, 11% of total spending on adults (fig.1).

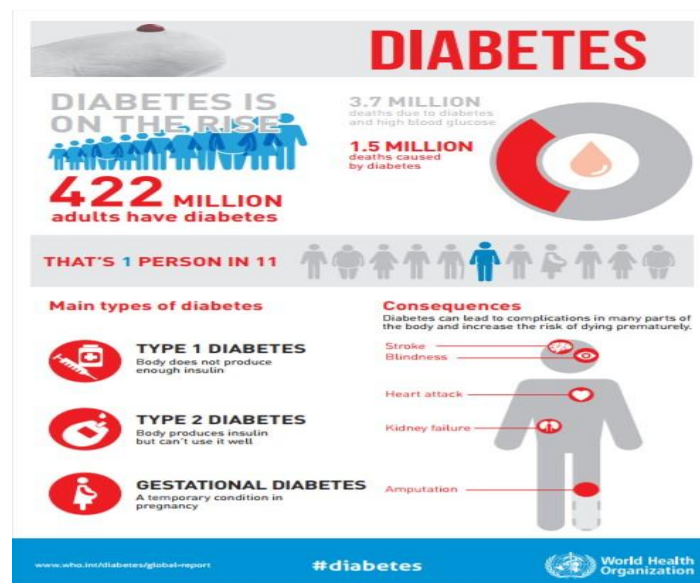


Figure 1: Diabetes is on the rise [16]

From the above data, it is prominent that diabetes has become a worldwide threat to public health. Despite being a non-communicable disease, diabetes has spread worldwide and become a threat to the public health care system. Incorporation of effective preventive interventions is not only necessary but it is also required for the implementation of measurement methods to detect and control this overgrowing disease. The primary causes behind non-communicable diseases, including diabetes, are ageing, rapid and unplanned urbanization, and the globalization of unhealthy lifestyles [11]. According to a WHO survey, it has become an obvious threat to people in low- and middle-income countries, with a killing power of more than 36 million people each year. WHO identifies the root factors of NCDs like diabetes, such as unhealthy lifestyle, physical inactivity, and the harmful use of alcohol and unhealthy diet [11].

In addition to this, the main factors of the diabetes epidemic are:

- Change to unhealthy diets leading to increased calories and glycaemic load,
- Reduction in physical activity and
- Urbanization [1].

In recent years, India has experienced a dramatic shift in eating habits. White rice became the new staple food, coupled with sugar and oil. People also started spending more time eating in restaurants and hotels, which increased their consumption of meals that are high in these hazardous substances. At the same time, pizza, burgers, and sugary soft drinks began to permeate Western menus. There was an unexpected increase in the diets' calorie, carbohydrate, sugar, and fat intake. This led to insulin resistance and ultimately to diabetes due to the pancreas's inability to meet the body's insulin needs.

Rapid dietary shifts were accompanied by an equally alarming rise in inactivity. Motorized vehicles became widely used. People in the village no longer had to walk long distances in order to get where they needed to go. The country's health situation drastically shifted as a result of the fatal mix of poor food and lack of exercise. Young people, and then children and adolescents, began seeing an increase in cases of obesity, diabetes, and high blood pressure as a result (fig.4).

Lifetime risk of developing diabetes in urban metropolitan Indian adults

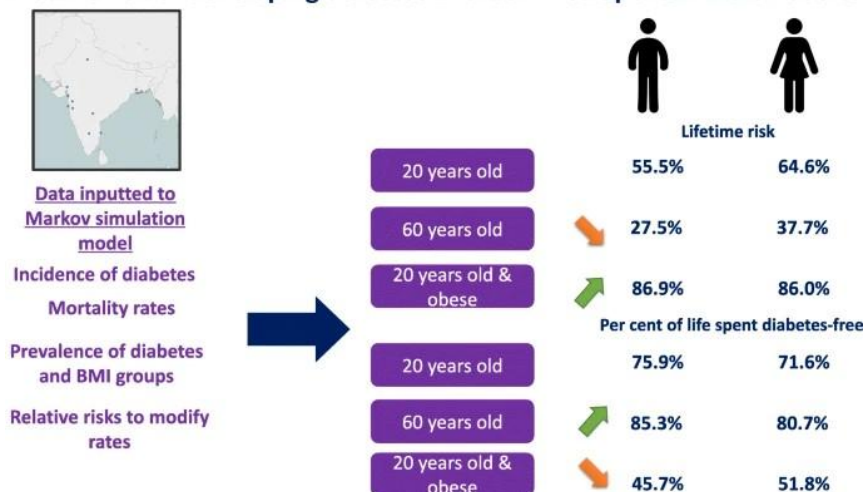


Figure 4: Lifetime risk of developing diabetes in urban metropolitan Indian Adults [7]

Stress and depression went hand in hand with a decline in nutritional habits and physical activity. Pre-diabetes is more common than diabetes itself in India. In this way, diabetes can be avoided.

3. Preventive Measures and Associated Ethical Dilemmas

The preventative measures advocated for by the World Health Organization (WHO) [11] include eating a healthy diet, engaging in regular physical activity, maintaining a normal body weight, and refraining from using tobacco products, as well as controlling blood glucose, blood pressure, and blood lipid, and screening for early signs of diabetes-related kidney disease. Surveillance, prevention, and control of diabetes and its consequences are prioritised by WHO [15], particularly in low and middle-income countries.

The World Health Organization [11] also promotes awareness of the worldwide epidemic of diabetes through its association with the International Diabetes Federation in the commemoration of World Diabetes Day (November 14) and by conducting surveillance of diabetes and its risk factors. The World Health Organization's (WHO) "Worldwide Strategy on Diet, Physical Activity, and Health" (May 2004) WHO [11] is another initiative that tries to combat the rising global epidemic of overweight and obesity by encouraging a healthy lifestyle among the world's population.

This article wants to critically discuss whether there are any specific ethical issues raised by the above-mentioned public health interventions to prevent diabetes (fig.5).

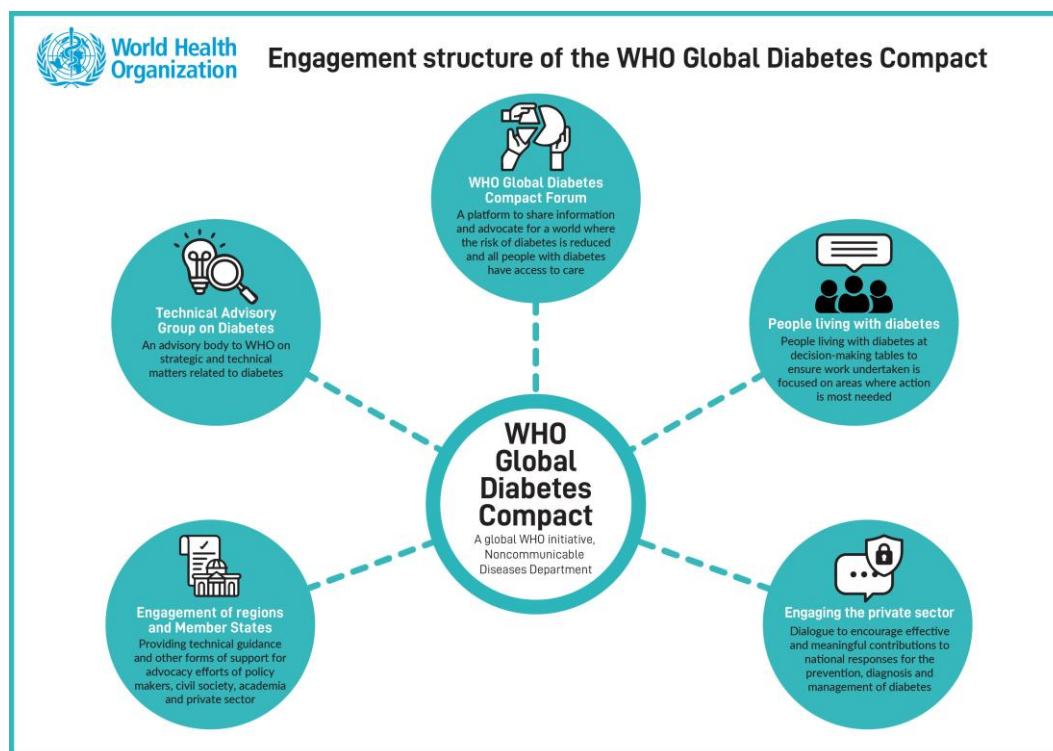


Figure 5: WHO Global Diabetes Compact [17]

4. Ethical issues may arise from the preventive measures of diabetes

4.1. Affordability and accessibility problem in the prevention of diabetes

The treatments are costly in most cases and last for a long duration. The people of lower-income countries, thus, generally have less capability for preventing and controlling diabetes though they are the most vulnerable, needy group. High-income countries are mostly covered by health insurance and are more likely to get proper treatment [13]. So, countries with inadequate health insurance coverage are unlikely to get essential NCD (Non-communicable diseases) interventions [11]. So, there are problems of affordability and accessibility of these treatments throughout a large area of this world. This leads to the violation of distributive justice.

4.2. Conflict between human rights and corporate rights

There are human rights involved with diabetes, like the right to be well informed about healthy diet and practices, the right to get freedom from passive smoking and the right to get adequate health services [2]. Though these might conflict with the rights of the medicine companies to satisfy those needs might lead to violation of the rights of holding product patents or freedom of advertisements. To arrange adequate healthcare services in poor developing countries, medicines and other healthcare resources should be free from patents, which significantly increase their cost. Also, the right to be well informed about healthy practices might limit the exaggeration of corporate companies' advertisements to promote their products.

4.3. Overlooking the other social determinants of diabetes in health programme

The health of the people of a society is directly dependent on the environment they are born, live, work, and grow up [14]. The government policy should not only include a prevention and control plan for diabetes but also should include an improvement plan for the overall environment where people spend their day-to-day life [5]. This implementation should not be dependent on the economic status of the person, and it should be considered everyone's basic rights.

4.4. Just distribution of resources

It is the obligation and duty of the developed countries to distribute the health care resources like medicines, health care professionals, etc., fairly around the world so that low and middle-income countries benefit from those resources despite

economic inequality. It will make it easy to compete with the threat of diabetes if just distributions of prevention measures are available worldwide.

4.5. Early genetic testing for the prevention of diabetes and some related issues

Family members may feel uncomfortable talking about the results of a genetic test, and doctors may be torn between disclosing the information and keeping it private [9]. Once again, misinterpretation of genetic risks may have long-lasting psychological or social consequences for individuals and their families (e.g., family planning). Genetic testing cannot guarantee a person will adopt a healthy lifestyle and set of behaviours. This conclusion is based on both logical and emotional considerations.

Some people might decide to change their ways and live healthier, while others would just accept their fate and carry on as usual. The availability and convenience of genetic testing may both improve if more people were aware of direct-to-consumer testing. Lack of consultation with a medical expert may lead to unnecessary examinations, incorrect interpretations, and incorrect applications of findings. Depending on how the results are kept private, customers may also experience a rise in perplexity, anxiety, and even prejudice or stigma. Safety concerns have led to the deferral of genetic testing for conditions like type 2 diabetes in children until they reach adulthood. However, numerous private genetic testing facilities accept paediatric patients, raising ethical concerns. Stigmatization, discrimination, and other negative psychosocial effects are all possibilities.

Moreover, this cost-effective measure is not affordable, making it less accessible to many areas. In general, the problem of affordability and accessibility is very much frequent in developing countries like India.

4.6. Privacy and surveillance

The rapid growth of diabetes can be controlled by using surveillance methods. Diabetes, in some cases caused by genetic inheritance. In such cases, the surveillance method reveals personal data of family history, leading to a privacy violation.

4.7. Liberty and adoption of some specific lifestyle

Adoption of a healthy life is mandatory to prevent diabetes. This includes regular physical activity, healthy diets such as fruits and vegetables, reduced sugar and saturated fats and avoidance of alcohol intake and tobacco usage. However, adult persons are free to live according to their lifestyles. So, adoption of these behaviours seems to impose on their free lifestyles, which leads to infringement of one's liberty.

5. Discussion and Possible Ethical Solutions

The consequences of diabetes, i.e., high morbidity and mortality rates worldwide spread among many people, compel public health professionals to take significant measures out of anxiety. Preventing and controlling them has become inevitable as they spread uncontrollably despite being non-contagious. Now the measures public health professionals plan to take are shifting from costly high-tech cure programs to less costly preventive programs. Here they have addressed four host susceptible factors of diabetes, i.e., physical inactivity, unhealthy diet, alcohol use, and tobacco use [13].

As all these factors are derived from unhealthy lifestyles, public health professionals emphasize leading healthy lifestyles. However, the compulsion to adopt healthy and disciplined lifestyles individuals might lead to a violation of their autonomous free will and liberty and raise the dilemma between autonomy and beneficence, as none but oneself can determine one's lifestyle. Public health authorities need to make some plans by which people can adopt healthy lifestyles by themselves. Here public health awareness and concern are very much necessary.

However, unlike infectious diseases here, the affected individuals with diabetes are the only victim, but they are not a vector or a threat to others [6]. So other individuals are not obliged to adopt public health measures to lead healthy lives. For example, a TB (Tuberculosis) patient is a victim and, simultaneously, a vector, and so is a threat to other individuals.

In this situation, other people, including the victim, are generally willing to take anti-TB Dots to protect community health and increase herd immunity against the TB virus. Here the principle of beneficence has justified reason to outweigh the principle of autonomy. Conversely, diabetes, which is not in any sense less burden compared to TB with its high morbidity and mortality rates and its worldwide spread, does not compel another individual, excluding the victim, to lead healthy, disciplined lifestyles (fig.6).



Figure 6: Global Diabetes Compact Forum [17]

To resolve this crisis, we need to change how we view this disease's impacts. Though diabetes has no immediate effect on the surrounding people of the victim, it is indeed a direct threat to public health, evident from the worldwide fatal spread of this disease despite its non-contagious nature. It is high time to be well concerned and aware of the dreadful consequences of this disease, and it should be taken as a direct threat to public health. General awareness and concern about this disease and its consequences and widespread nature are mandatory to control its fatal nature. So, if we see them as a direct threat, the dilemmas appear between non-maleficence and autonomy rather than a dilemma between autonomy and beneficence. Here the principle of non-maleficence applies differently, i.e., not only cause harm to others as well as, but we also have an obligation not to cause harm to our health too. Non-maleficence encourages individuals to adopt public health measures to protect their health, such as not being intoxicated. So right to protect health implies not only causing harm to others but also protecting their health from harm by changing the unhealthy practices in their lifestyles, i.e., promoting disease-free life.

Again, curing the affected public health requires costly technologies and medicines, but the question is how to maintain the just distribution of the limited resources among needy people. Now the developed countries with affluent healthcare resources have no obligation to fund those resources among needy people of low and middle-income countries as diabetes, a non-communicable disease, is not contagious like infectious diseases and is viewed as not a direct threat to them. Secondly, there might be a concern regarding the just distribution of funds between communicable and non-communicable diseases, especially in an epidemic of contagious diseases like COVID-19. In such emergencies, the excessive requirement of public health and medical funding to control and prevent infectious diseases often submerges other social facilities by the Government, such as education, nutrition, and economic development. Moreover, when medical resources, including medication, staff, etc., primarily concentrate on controlling the infectious disease epidemic, the question of unfair distribution evolves as deprivation occurs in other medical units in this very situation, such as concentrating only upon ICUs (Intensive Care Unit) in a hospital depriving other patients.

It's possible that the ethical foundation of the decisions made during these crises may be shaken. Unfair distribution of scarce healthcare resources is a major factor in these decisions failing to safeguard the most vulnerable citizens in developing nations. In this context, moral questions about fair treatment of people and their rights arise [4]. Panic, intense worry, and terror led public health authorities to make hasty choices and establish preventative measures after witnessing the terrible effects of an epidemic. These hasty required implementations for public health, however, have been carried out without obtaining informed permission. As a result, the ethics of infectious diseases might grow into their own distinct field, raising major questions about the fair distribution of resources and human rights. There is a lot at stake in detecting, treating, and preventing infectious diseases because of their high morbidity and mortality rates, and there will always be serious ethical problems whenever the fate of many people is in the balance [8]. Fear drives decision-making during a crisis. And when worry about these diseases drives clinical and public health policy, it can raise severe ethical concerns about fair treatment of people and the protection of their rights. These choices are made in an effort to stop the epidemic or pandemic entirely from a consequentialist perspective.

Decisions such as forceful quarantine and isolation have been taken, ignoring informed consent due to the lack of time and the situation's emergency. Although public health tools are implemented for the welfare of the community, it often conflicts with the autonomy-centred values of those who take an individualistic standpoint, as these implementations infringe upon an

individual's autonomous choices. However, some innocent quarantined people become victimized by these diseases as they are exposed to threats; here, the principle of non-maleficence (Do no harm) violates. Nevertheless, the situation can be justified by the 'Harm Principle' Mill, where he claimed that minor harm could be justified for the sake of greater benefit. In this situation, harm to some innocent people's health can be justified for public health benefit at large, as it happens on the war front where some innocent people are victimized for the sake of the whole country. According to this principle, an individual's subordination and liberty infringement by public health measures is justified as it is implemented to prevent disease threats to public health.

The ongoing tension between autonomous choice and public health may resolve if the focus and analysis can be sharpened on the population's health and common welfare. The effort to implement public health policies in a liberal society requires articulating a set of values and direct acknowledgement of the dilemmas that immediately emerge when these public welfare policies interfere with an individual's privacy, choice, and liberty. Again, in the emergency, the excessive requirement of public health and medical funding to control and prevent infectious diseases often submerges other social facilities by the Government, such as education, nutrition, and economic development. Moreover, when medical resources, including medication, staff, etc., are primarily concentrating on controlling the epidemic of infectious diseases, the question of unfair distribution evolves as deprivation occurs in other medical units in this very situation, such as concentrating only upon ICUs in a hospital, depriving other patients. Decisions taken in a hurry and confusion during this emergency may lack an ethical foundation. Often these decisions fail to protect the vulnerable people in developing countries due to unjust resource allocation of limited medical resources. Here ethical issues of just distribution of resources and human rights arise. Quality of health is interrelated with basic socio-economic rights, which are the major determinants of a disease-free healthy life. And diabetes, as a non-communicable and infectious disease by its unique characteristics, affects the quality of life in every aspect and invokes different ethical dilemmas.

Health should be considered a central goal worldwide and within every nation. Resources and funding for health care must be spent equally on communicable and non-communicable diseases. Disease-specific resource and fund allocation of public health violates just distribution as it deprives healthcare facilities of other diseases. For example, diabetes and TB should be equally regarded as public health burdens requiring equal concern and resource allocation for their prevention. Resources may only differ based on the equity principle by prioritizing the people's needs in emergencies for both communicable and non-communicable diseases. One possibility is to leverage existing resources to address the interactions between infectious and non-infectious diseases, such as the role of tobacco as a risk factor for tuberculosis and non-communicable diseases. To protect public health from both communicable and non-communicable diseases, it may be effective to link an individual's risk factors with other socio-economic determinants, such as the environment of the locality and the economic condition of the family where they were born and grew up. Socio-economic goods are the major and basic determinants of one's quality of health.

The world is suffering frighteningly from the emerging gap between haves and have-nots due to overlooking the major interrelationship between social-economic rights and quality of health. Low life expectancy and high infant mortality rates among the poor in developing countries than developed countries are the consequences of the lack of affordability of basic medication and lack of accessibility to basic social and economic rights such as the right to food, proper nutrition, clean water, hygienic house, community, education, jobs etc. The injustice arises from inequitable access to medical resources and allocations. Although these factors usually neglect while implementing health care measures, they significantly impact the overall health of individuals and the adoption of an individual's lifestyle. Public health professionals should implement healthcare measures and policies focusing on these broader socio-economic factors that influence an individual's behaviour and associated health risk.

Public health authorities should emphasize the availability of less cost-effective measures such as proper nutrition, clean water and growing awareness of regular physical activity to avoid obesity, etc., for controlling this deadly disease which avoids the high-cost medicine and genetic screening. Thus, we can evade the problem of affordability and accessibility of high medical technologies [4]. Research, medicine, and public health are situated in unequal social web relations, so medical ethics is failing to diminish the gap of social inequality, which is increasing with the advancement of research [3]. The benefits of the research on advanced medical technologies are not accessible to those (the largest number of people) who need it most. Surveys have shown that in the world's poorer countries, the affluent have easy access to both antiretroviral agents and therapy for renal insufficiency; Neonatal Intensive Care Units (NICU) are easily accessible for infants born in affluent families. At the same time, impoverished people, even those in wealthy nations, do not have basic, reliable access to sufficient medical care or the minimum benefits of medical science. Whenever more advanced and effective technologies are introduced to the world market, there will be, in the absence of an equity plan, a growing outcome gap – the unmentioned elephant in the room of medical ethics. So, proper equity policy is very much needed to prevent this outcome gap. It should come from government bodies, ethicists, and the community.

Finally, it can be said that with the way diabetes has impacted the world, it has become utmost necessary to take serious measures, which include all the governing bodies around the world such as health, finance, foreign affairs, education, agriculture, planning and others to work collectively [11] to get rid of the threat of diabetes and to avail the interventions of the effective measures to prevent and control it. We must also focus on lessening the risk factors of harmful practices associated with this disease. People can opt for reducing harmful practices such as too much addiction to tobacco products, following an unhealthy diet, very less physical activity and the harmful use of alcohol. Also, Government aided public health professionals should be able to provide primary healthcare services to the community's people for early detection and timely treatment. Government should prioritise the accessibility and availability of healthy food rather than harmful tobacco and alcoholic products by increasing the taxes on these harmful products [11] for the greater benefit of public health; otherwise, it violates the principle of non-maleficence and distributive justice.

The chief pursuit of this article is exploring the ethical issues raised by the preventive public health measures of diabetes. Here It addresses some ethical quandaries regarding the preventive methods of diabetes. Although WHO [11] provides some measures for preventing and controlling diabetes, it does not incorporate ethical principles in its strategies. This article addresses this gap and tries to fulfil it.

6. Conclusion

The distinct characteristics of diabetes raise some unique ethical dilemmas which are novel in this public health area. These ethical dilemmas are ignored while incorporating health plans, leading to societal injustice. It requires avoiding a medicine-centric myopic view of preventive health programs and considering the ethics of the neglected social determinants of public health. These methods should be implanted in a manner that makes the availability and accessibility of basic rights, which will lessen drug dependency. It also includes health education and human resources in the public health sectors. General awareness is necessary not only for the prevention of this disease rather to promote public health in general. Promoting general awareness is required in different sectors and areas of the community, and it also needs to involve community people actively in this awareness program. Moreover, to improve health scenarios, one should remove discriminatory procedures while implementing preventive measures and reduce unjustified limitations on personal liberty. Public health authorities should earn people's trust by gaining their confidence so that they will believe that public health measures are guided by ethical principles to reduce burdens and promote benefits. With this conviction, those problems can be solved. People should also adopt a healthy lifestyle by increasing their intake of protein and healthy fats while decreasing their consumption of carbohydrates and calories. Green leafy veggies are a great way to add healthiness to any diet. Yoga, meditation, and relaxation are all great ways to de-stress, but it's also important to encourage physical activity. All of them help, too, in warding off diabetes.

Acknowledgement: N/A

Data Availability Statement: The Study is based on WHO records, International Diabetes Federation, and Indian Science, Technology, & Innovation

Funding Statement: No funding was received to conduct the research

Conflicts of Interest Statement: N/A

Ethics and Consent Statement: The author of this work consent to make this publication available to all interested people for reading, teaching, and learning.

References

1. V. Mohan. Exploring Diabetes Epidemic in India. Indian Science, Technology, & Innovation. 2019. Available at: <https://www.indiascienceandtechnology.gov.in/featured-science/exploring-diabetes-epidemic-india> [Accessed 09-Sep.-2022].
2. G. Danaei et al., "National, regional, and global trends in fasting plasma glucose and diabetes prevalence since 1980: systematic analysis of health examination surveys and epidemiological studies with 370 country-years and 2.7 million participants," *Lancet*, vol. 378, no. 9785, pp. 31–40, 2011.
3. P. Farmer, "Farmer and Campos. Rethinking medical ethics," *Rethinking medical ethics. Developing World Bioethics*, vol. 4, no. 1, pp. 17–41, 2004.
4. P. Pandit, "Emerging Ethical Issue from the Worldwide Pandemic COVID-19," *International Interdisciplinary Research Journal*, vol. 3 (SI), pp. 240–246, 2020.

5. R. Upshur. What does public health ethics tell (or not tell) us about intervening in non-communicable diseases? *Pub Med* 2013; 10:19-28. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/23385545> [Accessed 18 March 2014].
6. S. Ebrahim and L. Smeeth, "Non-communicable diseases in low and middle-income countries: a priority or a distraction?" *The International of,* Epidemiology, vol. 34, pp. 961–966, 2005.
7. S. Lohar et al., "Lifetime risk of diabetes in metropolitan cities in India," *Diabetologia*, vol. 64, no. 3, pp. 521–529, 2021.
8. C. B. Smith et al., "Are there characteristics of infectious diseases that raise special ethical issues?" *Dev. World Bioeth.*, vol. 4, no. 1, pp. 1–16, 2004.
9. S. B. Haga, "Ethical issues of predictive genetic testing for diabetes," *J. Diabetes Sci. Technol.*, vol. 3, no. 4, pp. 781–788, 2009.
10. World Health Organization (WHO) Department of Non-communicable disease surveillance Geneva. Definition, Diagnostic and Classification of Diabetes Mellitus and its Complications. Report of a WHO consultation: WHO 1999. Available at: http://whqlibdoc.who.int/hq/1999/who_ncd_ncs_99.2.pdf [Accessed in 11th April 11, 2014]
11. World Health Organization (WHO). Diabetes. Fact sheets, Media centre: World Health Organization (WHO) March 2013. Available at: <http://www.who.int/mediacentre/factsheets/fs312/en/> [Accessed 18 March 2014].
12. World Health Organization (WHO). Non-communicable Diseases. Fact sheets, Media centre: World Health Organization (WHO) March 2013. Available at: <http://www.who.int/mediacentre/factsheets/fs355/en/> [Accessed 18 March 2014].
13. World Health Organization (WHO). Ethical tensions in dealing with non-communicable diseases globally. Bulletin of the World Health Organization. Sridhar Venkatapuram, Martin McKee & David Stuckler: WHO. February 2012. Available at: <http://www.who.int/bulletin/volumes/90/3/11-094789/en/index.html> [Accessed 18 March 2014].
14. World Health Organization (WHO). Diet and physical activity: a public health priority. Global strategy on diet, physical activity and health, Programmes: WHO 2014. Available at: <http://www.who.int/dietphysicalactivity/background/en/> [Accessed 18 March 2014].
15. World Health Organization (WHO). What are Social Determinants of Health? Social Determinants of Health, Programmes: WHO 2014. Available at: http://www.who.int/social_determinants/sdh_definition/en/ [Accessed 11th April 2014]
16. WHO updates fact sheet on diabetes, 2018. Available at: <https://communitymedicine4all.com/2018/11/05/who-updates-fact-sheet-on-diabetes/> [Accessed 11th June 2022]
17. WHO. 'The WHO Global Diabetes Compact'. 12 April 2021. Available at: <https://www.who.int/initiatives/the-who-global-diabetes-compact> [Accessed 11th June 2022]
18. J. da Rocha Fernandes et al., "IDF Diabetes Atlas estimates of 2014 global health expenditures on diabetes," *Diabetes Res. Clin. Pract.*, vol. 117, pp. 48–54, 2016.