Insufficient Level of Physical Activity and Its Effect on Health Costs in Low- and Middle-Income Countries

Wei Liu1,2, Abbas Dostdar-Rozbahani3, Fahime Tadayon-Zadeh4, Mohsen Akbarpour-Beni5, Mohammad Pourkiani6, Fatemeh Sadat-Razavi6, Vahid Barfi6 and Valiollah Shahedi3

Evidence suggests that mortality attributed to noncommunicable diseases (NCDs) will increase from 38 million in 2012 to 52 million by 2030. The recent epidemiological data show that these diseases are increasing in low- and middle-income countries so that about 80% of all deaths of NCDs occurred in low- and middle-income countries. It has been estimated that an insufficient level of physical activity leads to a large share of the burden of these diseases. Evidence suggests that the rate of insufficient levels of physical activity in low- and middle-income countries has increased over the past 15 years. The authorities and policymakers must be advocated with consistent evidence from low- and middle-income countries on productivity loss and increased healthcare costs due to the absence or insufficient levels of physical activity. It is also necessary to include physical activity across all policies to prevent possible escalation of the economic burden related to physical inactivity in the near future.

Keywords: cost, diseases, health, income, physical activity, WHO

INTRODUCTION

According to the WHO, any bodily movement produced by skeletal muscles that requires energy expenditure, including activities undertaken while playing, working, carrying out household chores, engaging in recreational pursuits, and traveling, is called physical activity (1).

The current physical activity recommendation is at least 150 min of moderate-intensity physical activity or 75 min of vigorous-intensity physical activity throughout the week for adults/elderly and 60 min of moderate-intensity to vigorous-intensity physical activity daily for children aged 5–17 years (2).

It is proven that regular physical activity has many physical and mental health benefits. For example, it is associated with reduced rates of cardiovascular disease, stroke, obesity, cancer, diabetes, as well as anxiety, depression, and other mental health problems (3).

Also, regular physical activity can lead to improvements in functional health, muscular and cardiorespiratory fitness, cognitive function, quality of life, and wellbeing (3).

As one of the lifestyle behaviors, physical activity reduces the risk of all-cause mortality by about 33% (4). However, the absence or insufficient level of PA causes many health problems. Annually, about 3.2 million deaths (including 9% premature deaths) are due to insufficient levels of
physical activity. In 2010, it was also the cause of 69.3 million disability-adjusted life years (DALYs) worldwide (1).

Evidence suggests that mortality attributed to non-communicable diseases (NCDs) will increase from 38 million in 2012 to 52 million by 2030 (5).

It has been estimated that an insufficient level of physical activity leads to a large share of the burden of main NCDs (about 10% in breast and colon cancer burden, about 7% in type 2 diabetes burden, and about 6% in chronic heart disease burden) (1).

INSUFFICIENT LEVELS OF PHYSICAL ACTIVITY AND NCDs IN LOW- AND MIDDLE-INCOME COUNTRIES

In the rich and developed countries, NCDs, such as diabetes, coronary artery disease, cancer, obesity, chronic respiratory diseases, and mental illnesses, such as depression, are until recently, defined as health problems associated with economic development (1).

However, recent epidemiological data show that these diseases are increasing in low- and middle-income countries so that the number of mortalities due to these diseases has increased. In general, about 60% of all deaths (equivalent to 35 million deaths) are due to NCD, of which 80% occurred in low- and middle-income countries, so about 50% occurred before the age of 70 years (6).

In 2020, NCDs accounted for 80% of the global burden of disease, which accounted for 7 out of every 10 deaths in low- and middle-income countries (7).

Some studies document the known risk factors for significant NCDs in low- and middle-income countries (8, 9). One of the critical risk factors is physical inactivity (10).

In 2016, the prevalence of insufficient levels of physical activity worldwide was about 27.5%. This prevalence was about 16.2 and 26% in low- and middle-income countries, respectively. In addition, the prevalence rate was higher among schoolgoing adolescents in these countries (11).

Evidence suggests that the rate of insufficient levels of physical activity in low- and middle-income countries has increased over the past 15 years (12).

Due to the prevalence of the COVID-19 pandemic, lifestyle has also been affected. Some studies show that physical inactivity has increased during the pandemic, which is a sign of deteriorating conditions in low- and middle-income countries.

INCOME INEQUALITY AND PHYSICAL ACTIVITY

The models estimate that with a point increasing income inequality, insufficient physical activity for the whole population in high-income countries increases (2.2% for men and 3.7% for women) (11).

Guthold et al. (11) observed 5% increase in the absence or insufficient physical activity in high-income countries over 15 years. They estimated that the effect size of the income inequality was large. Also, this association was weaker by about a third in income countries (11).

It seems that income inequality might be a determinant of insufficient physical activity and poor health; therefore, it needs to be more clearly considered and taken into account.

In large areas like countries or states, negative correlations are usually found between income inequality and health outcomes, while findings are less consistent in small areas like cities (13). This shows that income inequality could act as a global scale at the societal level, and for this reason, high-level policy measures are required to address it.

As countries transition from low- and middle-income to high-income economies, reducing income inequality can increase physical activity equity and global physical activity and prevent raise in insufficient physical activity and activity gender gap.

Another problem with income inequality in high-income settings vs. low-income countries is differences in the nature of the physical activity and whether it is utilitarian or volitional physical activity.

A recent study indicated that recreational or leisure-time physical activity was the only consistent relationship between socioeconomic status and self-reported physical activity so that people with low socioeconomic status did not have resources to direct to recreational or leisure-time physical activity and were more actively engaged in other domains of physical activity (14).

A study in the African region, most of which were low- and middle-income countries, found that about 79% of people were meeting the physical activity recommendations of WHO (15). However, only 5.3% accounted for leisure time activities and the vast majority of physical activity was utilitarian, in the form of transport-related (46.3%) or occupational (48.6%) physical activity (15).

It seems that the broader upstream factors, such as access to facilities and resources, infrastructure, and social determinants, such as safety from crime, affect the relationship between income inequality and its effect on the choice of physical activity in high-income countries compared to low- and middle-income countries.

HEALTH COSTS DUE TO PHYSICAL INACTIVITY IN LOW- AND MIDDLE-INCOME COUNTRIES

Most of the estimates of the economic costs of physical inactivity are limited to direct healthcare costs and almost all were conducted in high-income countries. Although an article in 2013 examined this issue globally, there is no evidence of the economic burden of physical inactivity in low-income countries in local studies. This point is the main limitation, because it is now estimated that most of the global NCD burden and levels of physical inactivity are in low- and middle-income countries (16).

However, direct healthcare costs due to physical inactivity in low- and middle-income countries were about INT$10.3 billion in 2013. This cost is about 19% of direct healthcare costs attributable to physical inactivity worldwide (13).

Also, the estimated direct health costs due to physical inactivity in China were USD$3.5 billion in 2007 (17). Global
Non-communicable diseases including diabetes, cancer, and heart and respiratory diseases currently cause 7 out of every 10 deaths worldwide. Evidence suggests that 85% of premature deaths (between ages 30–69 years) from these diseases occur in low- and middle-income countries, making them a huge health burden. However, the impact of these diseases on low- and middle-income countries is often underestimated. According to a new WHO report, if low- and middle-income countries consider an additional investment of less than a dollar per person per year to prevent and treat NCDs, close to 7 million deaths could be prevented by 2030. With the right strategic investments and evidence-based policies, low- and middle-income countries can change their disease trajectory and deliver significant economic and health gains for their citizens (1).

The absence or insufficient level of physical activity is one of the risk factors for chronic diseases that increase health-related costs. The economic burden of insufficient levels of physical activity and the inverse association of the economic cost of chronic diseases with physical activity were revealed by many studies (19).

Some studies showed that physical activity level increases with the increase in Human Development Index value (20) and the decrease in the Gini index, which is an index of wealth distribution of populations and inequality of income (21). Although physical activity level alone has shown a negative association with income level in low- and middle-income countries, the quality and quantity of physical activity have shown a positive association with the socioeconomic status of population subgroups as a whole in high-income countries (13).

It is important to identify strategies for physical activity promotion and cost-effective interventions in LMICs, and they should be well considered. For example, prescribing regular walking alone or along with medication as a cost-effective intervention and treatment regime for many chronic diseases can be considered to be implemented in low- and middle-income countries, because regular walking has a positive association with less medical expenditure (21).

Other problems are insufficient health research capacity and limited capacity and funding to conduct health economic research in low- and middle-income countries. Due to limited patient information systems and the absence of routine cost accounting systems in low- and middle-income countries, there are challenges in conducting economic evaluations in this context (22).

In general, a larger proportion of disease burden due to physical inactivity is consistently highlighted as a problem in low- and middle-income countries.

Although it is predicted that the economic burden of physical inactivity in low- and middle-income countries will be escalated in the near future, the current estimates of the economic burden of physical inactivity are huge in comparison with the income level of these countries. For this reason, it is important to draw the attention of policymakers and authorities to physical activity promotion as a priority measure in low- and middle-income countries.

Given the problems raised, it is suggested that low-income countries use low-cost interventions, such as walking, to improve the health of their citizens. Also, schools, as one of the environments with which most children and adolescents interact, can be an excellent and low-cost way to promote health-oriented behaviors as well as physical literacy. Another suggestion is a system of referral of physical activity from health centers to cheap health centers in order to cover a large part of the society.

CONCLUSION

The authorities and policymakers must be advocated with consistent evidence from low- and middle-income countries on productivity loss and increased healthcare costs due to the absence or insufficient levels of physical activity.

It is also necessary to include physical activity across all policies to prevent possible escalation of the economic burden related to physical inactivity in the near future.

AUTHOR CONTRIBUTIONS

MA-B and WL: designed the work, drafted the manuscript, and participated in writing the manuscript. FT-Z, MP, FS-R, and VB: gathered information and researched literature. AD-R and VS: revised the work. All authors read and approved the final manuscript.
REFERENCES

1. Organization WH. Saving Lives, Spending Less: The Case for Investing in Noncommunicable Diseases. Geneva: World Health Organization (2021).
2. Yang YJ. An overview of current physical activity recommendations in primary care. Korean J Fam Med. (2019) 40:135. doi: 10.4082/kjfim.19.0038
3. Brymer E, Davids K. Designing environments to enhance physical and psychological benefits of physical activity: a multidisciplinary perspective. Sports Medicine. (2016) 46:925–6. doi: 10.1007/s40279-016-0535-8
4. Lacombe J, Armstrong ME, Wright FL, Foster C. The impact of physical activity and an additional behavioural risk factor on cardiovascular disease, cancer and all-cause mortality: a systematic review. BMC Public Health. (2019) 19:1–16. doi: 10.1186/s12889-019-7030-8
5. Bennett JE, Stevens GA, Mathers CD, Bonita R, Rehm J, Kruk ME, et al. NCD Countdown 2030: worldwide trends in non-communicable disease mortality and progress towards sustainable development goal target 3.4. Lancet. (2018) 392:1072–88. doi: 10.1016/S0140-6736(18)31992-5
6. Ndubuisi NE. Noncommunicable diseases prevention in low-and middle-income countries: an overview of health in all policies (HiAP). Inquiry. (2021) 58:0046958020927885. doi: 10.1177/0046958020927885
7. Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. Lancet. (2020) 396:1204–22. doi: 10.1016/S0140-6736(20)30925-9
8. Organization WH. Preventing Noncommunicable Diseases (NCDs) by Reducing Environmental Risk Factors. Geneva: World Health Organization (2017).
9. Amini H, Habibi S, Islamoglu A, Isanejad E, Uz C, Daniyari H. COVID-19 pandemic-induced physical inactivity: the necessity of updating the global action plan on physical activity 2018-2030. Environ Health Prev Med. (2021) 26:1–3. doi: 10.1186/s12199-021-00935-z
10. Katsmarzyk PT, Friedenreich C, Shiroma EJ, Lee I-M. Physical inactivity and non-communicable disease burden in low-income, middle-income and high-income countries. Br J Sports Med. (2022) 56:101–6. doi: 10.1136/bjsports-2020-103640
11. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1-9 million participants. Lancet Glob Health. (2018) 6:e1077–e86. doi: 10.1016/S2214-109X(18)30357-7
12. Vancampfort D, Van Damme T, Firth J, Smith L, Stubbs B, Rosenbaum S, et al. Correlates of physical activity among 142,118 adolescents aged 12–15 years from 48 low-and middle-income countries. Prev Med. (2019) 127:105819. doi: 10.1016/j.ypmed.2019.105819
13. Ding D, Lawson KD, Kolbe-Alexander TL, Finkelstein EA, Katsmarzyk PT, Van Mechelen W, et al. The economic burden of physical inactivity: a global analysis of major non-communicable diseases. Lancet. (2016) 388:1311–24. doi: 10.1016/S0140-6736(16)30383-X
14. Stalsberg R, Pedersen AV. Are differences in physical activity across socioeconomic groups associated with choice of physical activity variables to report? Int J Environ Res Public Health. (2018) 15:922. doi: 10.3390/ijerph15050922
15. Guthold R, Louazani SA, Riley LM, Cowan MJ, Bovet P, Damasceno A, et al. Physical activity in 22 African countries: results from the World Health Organization STEPwise approach to chronic disease risk factor surveillance. Am J Prev Med. (2011) 41:52–60. doi: 10.1016/j.amepre.2011.03.008
16. Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, et al. Global physical activity levels: surveillance progress, pitfalls, and prospects. Lancet. (2012) 380:247–57. doi: 10.1016/S0140-6736(12)60646-1
17. Zhang J, Chaaban J. The economic cost of physical inactivity in China. Prev Med. (2013) 56:75–8. doi: 10.1016/j.ypmed.2012.11.010
18. Popkin BM, Kim S, Rusev ER, Du S, Zizza C. Measuring the full economic costs of diet, physical activity and obesity-related chronic diseases. Obes Rev. (2006) 7:271–93. doi: 10.1111/j.1467-789X.2006.00230.x
19. González K, Fuentes J, Márquez JL. Physical inactivity, sedentary behavior and chronic diseases. Korean J Fam Med. (2017) 38:111. doi: 10.4082/kjfm.2017.38.3.111
20. Atkinson K, Lowe S, Moore S. Human development, occupational structure and physical inactivity among 47 low and middle income countries. Prevent Med Rep. (2016) 3:5–40. doi: 10.1016/j.pmedr.2015.11.009
21. Silva DA. Relationship between Brazilian adolescents’ physical activity and social and economic indicators of the cities where they live. Percept Mot Skills. (2015) 120:355–66. doi: 10.2466/06.PMS.120v11s5
22. Pitt C, Vassal A, Teerawattananon Y, Griffiths UK, Walker D, et al. Foreword: health economic evaluations in low-and middle-income countries: methodological issues and challenges for priority setting. Health Econ. (2016) 25(Suppl. 1):t. doi: 10.1002/hec.3319

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher’s Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Copyright © 2022 Liu, Dostdar-Rozbahani, Todayon-Zadeh, Akbarpour-Beni, Pourkiani, Sadat-Razavi, Barfi and Shahedi. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.