

Editorial.

Pathological Causes of Deaths Due to Cardiovascular Diseases and Other Chronic Diseases in Russia with Reference to BRICS Countries

**Sergey Chibisov¹, Elena Kharlitskaya²,
V. I. Torshin³, Mikhail Blagonravov^{1,*},
O. A. Al-bawared⁴, Maria Abramova⁴,
and Ram B. Singh⁵**

¹V.A. Frolov Department of General Pathology and Pathological Physiology, Peoples' Friendship University of Russia (RUDN University), Russia

²Faculty of Veterinary Science, Peoples' Friendship University of Russia (RUDN University), Russia

³Department of Normal Physiology, Peoples' Friendship University of Russia (RUDN University), Russia

⁴Department of Human Anatomy, Peoples' Friendship University of Russia (RUDN University), Russia

⁵Halberg Hospital and Research Institute, Moradabad, India

Introduction

Mortality rates in Russia decreased for non-communicable diseases (NCDs) and all other major causes of death between 1980 and 2016 according to the Global Burden of Disease (GBD) 2016 Study by the GBD 2016 Russian Collaborators [1]. However, in India, morbidity and mortality due to CVDs and diabetes continue to increase. There is a need to modify this new US model of health care for prevention of these diseases in BRICS countries (Brazil, Russia, India, China and South Africa). The causes of death and the burden of disease overall among BRICS countries show that most (71%) deaths are caused by NCD, between the level seen for lower middle-income countries like India (59% vs 82%) and upper middle-income countries like Russia and China [2]. South Africa and India, two BRICS countries, have over a quarter of deaths due to communicable diseases, indicating that these countries are not as advanced in epidemiological transition. Injuries account for over half of deaths for those aged between 15 and 29 in China and Russia. HIV/AIDS accounts for a quarter of deaths in South Africa as opposed to less than two percent in all of the other BRICS countries, while the two largest causes of death by communicable disease in India are tuberculosis and diarrheal diseases.

The concept of the BRICS countries was first coined in 2001 for four emerging economies and expanded to include South Africa in 2010. These countries are quite influential in their own regions, and represent a significant proportion of the world's population and trade. The BRICS bloc has been famous for having mutual economic interests and

* Corresponding Author's E-mail: blagonravovm@mail.ru

global issues as well as for their potential to influence global health. However, according to WHO, “BRICS represents a block of countries with a great potential to move global public health in the right direction towards reducing the current vast gaps in health outcomes and introducing greater fairness in the way the benefits of medical and scientific progress are distributed” [2, 3]. The Goa Declaration of 2016 demonstrates the will of BRICS to collaborate to improve health [2, 3].

The economic attributes of BRICS are largely distinguished by their large, and in some cases rapidly growing economies. In 2015, BRICS had an average GDP per capita of US \$6,596, up from US \$2,086 in 1992. The greatest change occurred in China where GDP per capita increased from US \$318 to US \$8,028 over this 25-year period. Since a peak in 2013, overall GDP per capita in BRICS has decreased nearly a quarter, though on an individual country level it has continued to increase in China and India. The downturn in GDP per capita was most noticeably seen in Russia which decreased by 42% between 2013 and 2015, while a 35% decrease was seen in Brazil between 2011 and 2015, where GDP per capita is now lower than it was in 2008. The combined GDP of BRICS countries as a percentage of global GDP has almost tripled from 7.9% in 1990 to 22.3% in 2015 [2]. The total expenditure on health as a percentage of GDP is lower in each of the BRICS countries than the global average (9.94%), and ranges from 4.69% in India to 8.8% in South Africa, with an average of 6.88% [4]. Annual per capita health expenditure differs widely, from US \$75 in India to US\$947 in Brazil with an average of US \$581, just over half of the global figure. The structure of the Indian health care system is hopeless because health insurance is limited to less than 5% of population. Nearly two thirds of the health care providers are private which has led to a high proportion of out-of-pocket expenditure (62.4% in 2014), the 10th highest globally [2-4].

The BRICS countries represent almost half of the world’s population, which is particularly concentrated in China and India, both containing more than a billion inhabitants. Average life expectancy in BRICS stands a fraction below the global mean. It varies from 62.9 in South Africa to 76.1 in China. Steady increases in life expectancy since 1960 in Brazil and

India contrast to an accelerated increase in China between the 1960s and 1980s. Improvement of health care in China may be due to well-targeted public health campaigns that reduced infant and child mortality and communicable diseases; and because of improved economic conditions impacting nutrition, education and distribution of health services. Life expectancy gains from the 1960s onwards in South Africa were largely lost during the 1990s but increased annually since 2005; however, fluctuation and stagnation have meant the Russian Federation has gained less than five years in life expectancy since 1960.

Risk Factors for Non-Communicable Disease

As countries develop economically, the burden of disease shifts from being predominantly infectious disease-based to long-term non-communicable disease (NCD)-based. The presence of behaviors or conditions such as raised blood glucose, raised blood pressure, obesity, and tobacco consumption act as risk factors for NCD such as cardiovascular disease, cancers, and diabetes mellitus.

The average prevalence of raised blood pressure in BRICS is higher than global averages for both males and females. Exceptions to this are China which has lower blood pressure for both genders and South Africa where slightly fewer females have raised blood pressure. Similar to global patterns, a greater proportion of males have raised blood pressure compared to females. There is an over 10% difference between China and the Russian Federation in the prevalence of raised blood pressure in males, with the latter in 20 countries worldwide. The Russian Federation also has the greatest discrepancy between males and females, with a 10.3% difference. Levels of obesity among BRICS differ greatly between countries, particularly among females. The prevalence of obesity in females in South Africa is over double that of the global level, and is seven times greater than that in India. Male obesity also differs over a wide range between BRICS countries, demonstrating that the health status of these countries is far from uniform. South Africa planned to implement a 20% tax on sugary drinks in 2017 to tackle obesity and

diabetes, the first of the BRICS countries to take this measure.

Overall, almost four times as many men consume tobacco in BRICS compared to females, though this ratio ranges from 1.7 times in Brazil to 25.6 in China.

The consumption of tobacco through smoking follows a similar gender pattern to that seen globally, with rates being far higher in males than females. At 59.8%, the proportion of males smoking in the Russian Federation is the fourth highest globally, substantially raising the risk of several NCD, such as lung cancer and chronic obstructive pulmonary disease. Almost four times as many men consume tobacco in BRICS overall compared to females, though this ranges from 1.7 times in Brazil to 25.6 in China.

Causes of Death and the Burden of Disease

Overall, among BRICS countries, most (71%) deaths are caused by NCD and ranges between the level seen for lower middle-income countries (59%) and upper middle-income countries (82%). In South Africa and India, the two BRICS which are eligible for Global Fund support, over a quarter of deaths are caused by communicable disease, indicating that these countries are not as advanced in the epidemiological transition. HIV/AIDS accounts for a quarter of deaths in South Africa as opposed to less than two percent in all of the other BRICS countries, while the two largest causes of death by communicable disease in India are tuberculosis and diarrheal diseases. Injuries account for over half of deaths for those aged between 15 and 29 in China and Russia.

The top three causes of the burden of disease in BRICS countries are due to NCDs, reflecting the epidemiological transition these countries are undergoing as they develop economically. However, the distribution of the burden is diverse among BRICS, with communicable disease far more prevalent in South Africa and India than the Russian Federation and China. Twenty nine percent of disability-adjusted life years (DALYs) in South Africa are due to HIV/AIDS, in stark contrast to the rest of BRICS for which the figure is under

3%. The burden of disease caused by maternal, neonatal or nutritional conditions in India (16%) is more than double that of the next highest country, Brazil (6.8%), and more than five times greater than in Russia (3.1%). Cardiovascular disease is the leading cause of DALYs overall, though between countries it ranges from 8.5% of DALYs in South Africa to 37% in Russia. The burden of malignant neoplasms also varied from 5.2% of DALYs in India to 16.6% in China. In Russia, two thirds of professional staff are National Professional Officers, while the rest are international officers. The Russian Federation has the highest proportion of nationals working at professional level, at 83%, while South Africa has the least (50%). Globally, BRICS contain 6% of the overall professional workforce of total WHO workforce at country level.

Mortality Rates and Control of Risk Factors in Russia

The reduction in mortality rates in Russia due to NCDs has occurred through control of risk factors [1, 5]. The prevalence of the most important risk factor, high blood pressure, increased over the past decades, hence, these achievements seem to be primarily due to substance control policies, specifically WHO's so-called best buys [5-9]. These efforts resulted in marked declines in tobacco and alcohol use, more specifically in Russia [10-12]. Recent trends of tobacco intake have been measured via the Global Adult Tobacco Survey (GATS), a nationally representative household survey of individuals aged 15 years or older, with standard tobacco monitoring indicators [8]. As part of the Global Tobacco Surveillance System, this survey was first implemented in Russia in 2009 (n = 11,406), and was repeated in 2016 (n = 11,458), with response rates of 98%. GATS found a significant 21.5% reduction in the prevalence of smoking, from 39.4% (95% CI: 38.0–40.8) in 2009 to 30.9% (29.4–32.4) in 2016, and this reduction was proportionally lower among men (16%) than among women (34%). Exposure to second-hand smoke also decreased. These reductions in tobacco exposure are associated with Russia's Federal Law (No. 15-FZ), passed in 2013, which

included a smoke-free policy for public places, increased taxes on tobacco products, enacted advertising, promotion, and sponsorship bans, and strengthened prohibitions on selling tobacco to minors [10]. The Ministry of Health's graphic health warnings on cigarette packages, introduced in 2012, were also helpful in this decline. Alcohol use indicators also decreased substantially. The most important indicator, adult per capita consumption, decreased from 2010 to 2016 by 26.1%, from 15.8 L (95% CI: 15.2–16.5) to 11.7 L (11.2–12.2) of pure alcohol (both figures are based on 3-year moving averages) [11–13]. Heavy episodic drinking (defined as consuming 60 g or more of pure alcohol on at least one drinking occasion in the past 30 days) decreased by 14.3%, from 49.4% (95% CI: 26.2–61.0) in 2010 to 42.3% (20.8–54.6) in 2016. The decrease in heavy episodic drinking was proportionally larger for men (–16.9%) than for women (–10.4%).

Alcohol exposure data have been validated at the country level and were consistent between sales figures and survey results. The reductions in alcohol use described above are likely to have resulted from policy measures (including all best buys) instituted over the past decade, such as the gradual raising of the minimum price on spirits since 2010 [7]. Although the noted comparisons are for 2010 and 2016 (to align with the tobacco statistics), changes in alcohol legislation and declines in alcohol use and attributable mortality started before 2010 [13]. Differences between studies may reflect different methodologies, however; both studies indicate a high proportion of premature mortality in Russia due to alcohol. In addition, as unrecorded alcohol use is an important part of overall use, it is difficult to estimate for Russia in any study [11–14]. In the 1990s, among people aged 15–54 years, 59% of all male deaths and 33% of all female deaths were attributable to alcohol [11–14]. The higher estimates reported by some experts may be primarily due to considerably higher drinking levels in the 1990s and the fact that the study involved only three cities [15]. Despite reductions in alcohol and tobacco use, the fact that alcohol contributes to more than every third death in early and middle adulthood in Russia, and that mortality in this age category remains high, suggests that there is still substantial room for improvement. Given Russia's proportion of alcohol-attributable deaths relatively

early in life, and that over half of Russian men use tobacco, the potential to further increase life expectancy for Russia through effective control policies is enormous [11–15].

Alcohol use appears to be a major determinant of life expectancy and burden of disease for Russia as well as for Eastern and Central Europe [16, 17]. Unlike tobacco, alcohol-related deaths occur early in the life course. The GBD study reported that among people aged 15–49 years, 34.4% (95% CI: 29.5–38.6) of male deaths and 20.1% (17.1–23.4) of female deaths were due to alcohol [1]. WHO estimates are higher, indicating that among people aged 15–49 years old, 38.6% (95% CI: 35.3–40.7) of male deaths and 30.3% (95% CI: 27.6–32.5) of female deaths were due to alcohol. The contractility of myocardium is determined by many factors related to biochemistry and physiology, which are under the influence of environmental factors because of the association of inflammation, heavy meals, magnesium, nitrite, and coenzyme Q10 deficiency and circadian rhythms with risk of acute coronary syndromes [18–21].

In brief, the prevention of deaths and disability due to CVDs and other chronic diseases requires approaches different than just reduction/cessation of alcohol, tobacco, and obesity adopted in high-income countries. In the Western world, there is little or no consideration for the chronobiologic risk factors of NCDs, which should be given their due consideration in the development of the guidelines for the prevention of CVDs in BRICS countries [22].

Ethical Compliance

The authors have stated all possible conflicts of interest within this work. The authors have stated all sources of funding for this work. If this work involved human participants, informed consent was received from each individual. If this work involved human participants, it was conducted in accordance with the 1964 Declaration of Helsinki. If this work involved experiments with humans or animals, it was conducted in accordance with the related institutions' research ethics guidelines.

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