Volume: 10 Issues: 78 Special Issue [November, 2025] pp. 562 – 575
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107844

IMPACT OF ARMS RACE ON HUMAN DEVELOPMENT BETWEEN THE UNITED STATES AND RUSSIA

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Article history
Received date : 17-10-2025
Revised date : 18-10-2025
Accepted date : 1-11-2025
Published date : 13-11-2025

To cite this document:
Teo, E. T., Chin, H. C., Tiong, L. H. H., Yasin, Y. F., & Yusof, J. (2025). Impact of arms race on human development between the United States and Russia. *Journal of Islamic, Social, Economics and Development (JISED),* 10 (78), 562 – 575.

Abstract: *This study investigates the effects of the Cold War arms race (1947–1991) between the United States and the Soviet Union on human development, with particular attention to healthcare, education, and economic growth. A mixed-methods approach integrates quantitative data from government budgets, health statistics, and economic performance with qualitative evidence from declassified documents, academic research, and case studies. A comparative historical method shows how resources were redirected from social programs to military spending, creating long-term structural weaknesses in both nations. The study expects to reveal the costs of underfunded healthcare, distorted educational priorities, and the consequences of Soviet central planning and the U.S. market-based system. It also examines the "security paradox," where heavy military investment weakened social and economic stability even while aiming to increase national power. The research seeks to demonstrate a link between Cold War militarization and setbacks in human development, offering insights into the broader trade-offs of superpower competition.*

Keywords: *Human Development, Cold War, Arms Race, Comparative Historical Analysis*

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Introduction

The Cold War arms race (1947–1991) significantly reshaped the economic priorities of the United States and the Soviet Union, redirecting vital resources away from healthcare, education, and long-term development toward military expansion. In the Soviet Union, defence spending consumed an estimated 15–25% of GDP at its height, leaving healthcare investment at under 1% of GDP and triggering systemic crises, including a deficit of 26,500 physicians and a 128-fold increase in measles cases due to underfunded vaccination programs (Popovich et al., 2023; Field, 1995). A similar pattern was evident in the United States, where defence absorbed more than 54% of federal discretionary spending by 1985, deepening healthcare disparities and limiting education funding growth to just 1.2% annually, despite policy efforts such as the National Defence Education Act that emphasized STEM fields (Sambas et al., 2024; Felton, 2009). Economically, Soviet central planning directed up to 20% of industrial production toward armaments, leading to chronic consumer goods shortages and a slowdown in annual growth to 1.3%. Meanwhile, the U.S. reliance on military Keynesianism initially stimulated postwar GDP but ultimately contributed to inflation rates reaching 12% by 1975 (Aslund, 2025; Lee, 2025). This militarization reinforced a broader "security paradox," in which massive nuclear arsenals, peaking at 9,614 active warheads, undermined social and economic resilience by diverting capital from innovation and weakening societal stability (Pifer, 2016; Burrows, 2025).

Literature Review of The U.S. Against Russia Arms Race in Historical Overview

During the mid-20th century, the arms race of the United States against Russia, formerly known as the Soviet Union, was a unique defining feature of global politics. The war race triggered once the U.S. became the first nation to develop and simultaneously adopt nuclear weapons that originated in the post-World War II period. In 1949, a terrible test occurred: the Soviet Union attempted its own atomic bomb, marking the beginning of a protracted rivalry (Holloway, 1994). By investigating the Cold War period, estimated from 1947 to 1991, both nations engaged in extraordinary military activity. Therefore, the famous crisis that was triggered by missiles in Cuba in 1962 exemplified that the world was closer to nuclear conflict. It will significantly threaten human survival and global security (Allison, 2013). Many treaties, such as SALT I in 1972, SALT II in 1979, and START I in 1991, were considered efforts to reduce tensions. However, mistrust among each party often limited their success (Norris & Kristensen, 2010).

Disarmament was initially proposed during the post-Cold War era (1991 to the 2000s), when Russia's military capabilities began to decline due to its struggling economy. However, hostilities were rekindled by NATO's expansion and a resurgent geopolitical rivalry. Both Russia and the United States updated their nuclear arsenals by the 2000s; Moscow responded with revolutionary means of delivering such hypersonic missiles, while Washington pursued missile defence systems (Acton, 2018). The U.S. withdrawal from the Anti-Ballistic Missile (ABM) Treaty in 2002 and the suspension of the Intermediate-Range Nuclear Forces (INF) Treaty in 2019 are both instances of new geopolitical flashpoints that have influenced the arms race of the 21st century (Reif, 2019). In an effort to discourage Russian aggression, the United States significantly increased its defence expenditures after Russia take-over of Crimea in 2014 and its invasion in full scale condition of Ukraine in 2022 (SIPRI, 2023).

According to scholars, the weaponry race has significantly impacted internal human development and worldwide peace and security. Although the military might be frequently defended for national security, it took enormous funds away from infrastructure, healthcare,

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and social development (Kennedy, 1987; Intriligator & Brito, 1984). Though it also solidified a military-industrial complex that transformed political objectives, military Keynesianism in the United States supported industrial progress (Melman, 1974; Hooks, 1991). Thus, the literature demonstrates that the U.S. vs. Russia arms race has evolved through multiple phases of the Cold War, post-Cold War, and modern era, each with profound implications for national priorities and broader human development outcomes. Therefore, the main development of the U.S. and Russia can be concluded as follows: Figure 1 is divided into six stages from 1949 to the 2020s.

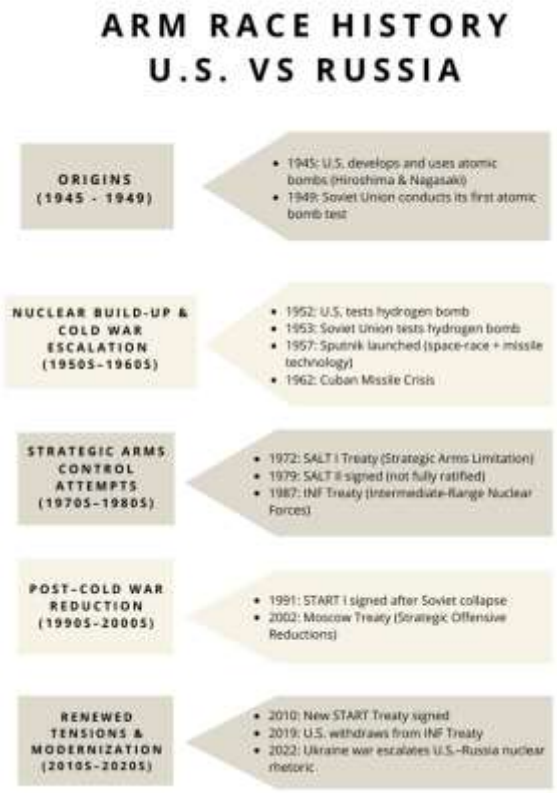

Figure 1: Summary of Historical Review on the United States versus Russia's Arms Race

Source: Author's Own Work

Methodology

To employ a qualitative research methodology, this investigation integrated historical analysis with a review of secondary data. The research design is descriptive and analytical, aiming to explore the horizon of the relationship between the United States and Russia under circumstances of the arms race, thereby discussing in-depth the human development outcomes. The analysis can be classified and structured into three stages, as shown in Figure 2, and will be further discussed in this case. First, a further observation on the historical review of the arms race is conducted to trace its origins, evolution, and major turning points. For instance, the nuclear arms buildup of the 1950s to 1960s, the Cuban Missile Crisis, the Strategic Defence Initiative in the 1980s, and post-Cold War disarmament treaties. Sources include books, peer-reviewed journals, and archival documents (Gaddis, 2005; Allison, 2017).

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Second, thematic analysis is applied to examine the consequences of military expenditures on human development indicators, including education, healthcare, technological advancement, and social welfare. The study considers both positive outcomes triggered by technological innovation and educational reforms. Simultaneously, the negative consequences, including social inequality and diversion of resources from welfare, will be scrutinized. On the other hand, an application of a secondary data set proposes comparative data analysis from reputable institutions such as Stockholm International Peace Research Institute (SIPRI), the World Bank, and the United Nations Development Programme (UNDP). These data sources provide statistics on military spending as a share of GDP, human development indices, and social sector expenditures, which are published by a reliable source. By triangulating historical narratives, scholarly interpretations, and empirical data, the methodology ensures a balanced understanding of the complex conflict between militarization and human development in the U.S. and Russia, which play a central role and are indirectly characterized, enabling the human development affected in advancement and regression. Hence, depending on the different perspectives, Table 1, which concluded the literature review, helped us to assemble the information through three adequate resources.

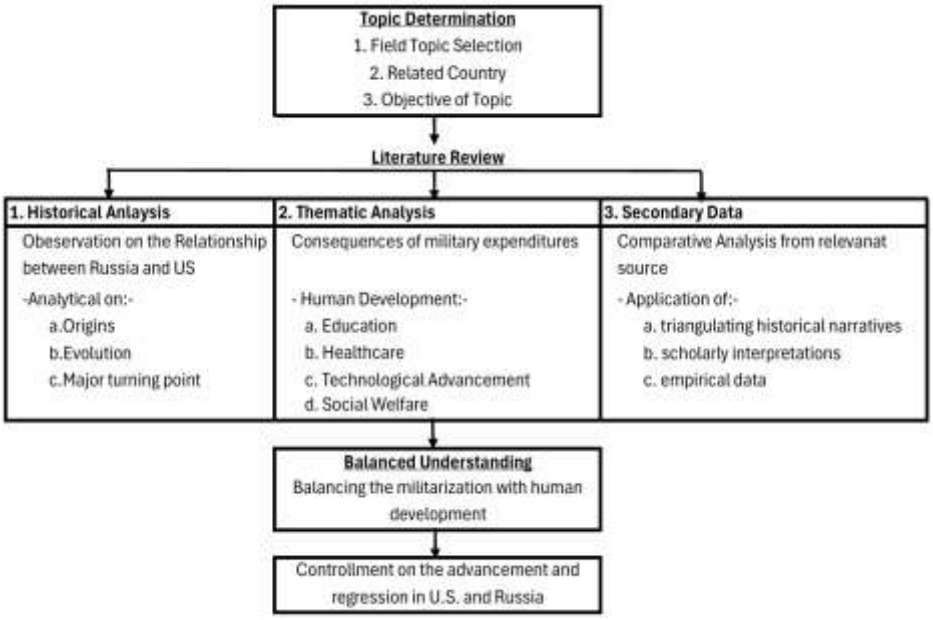

Figure 2: Methodology Flow Chart for War Arm Race Between the U.S. and Russia
Source: Author's Own Work

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Table 1: Detailed Information of Literature Review

Method Used	Description	Key References
Historical Review	Tracing origins, evolution, and turning points of the U.S.–Russia arms race (e.g., 1950s nuclear buildup, Cuban Missile Crisis, 1980s SDI, post–Cold War treaties).	1. Gaddis (2005); 2. Allison (2017); 3. Holloway (1994); 4. Norris & Kristensen (2010); 5. Acton (2018)
Thematic Analysis	Examining consequences of military spending on human development (healthcare, education, technology, welfare, inequality).	Kennedy (1987); Intriligator & Brito (1984); Melman (1974); Hooks (1991); Russett (1982); Boyd (2011); Masco (2006)
Secondary Data / Comparative Analysis	Using datasets from reputable institutions (SIPRI, UNDP, IMF, World Bank, EBRD) to analyze military spending, HDI, and social sector trade-offs.	1. SIPRI (2023); 2. UNDP (2020); 3. EBRD (2022); 4. IMF (2023); 5. Connolly (2022)

Source: Compiled From Gaddis (2005), Allison (2017), Holloway (1994), Norris & Kristensen (2010), Acton (2018); Kennedy (1987), Intriligator & Brito (1984), Melman (1974), Hooks (1991), Russett (1982), Boyd (2011), Masco (2006); SIPRI (2023), UNDP (2020), EBRD (2022), IMF (2023), Connolly (2022)

Human Development Impact of the United States

The struggling conflicts among these countries have significantly affected worldwide and human well-being, particularly impacting population growth by generating a reverse effect on healthcare, education, economic stability, and social welfare. Whether direct or indirect, the current conflicts between Russia and the United States emphasize military investment, acting as a resistance that takes resources away from development needs and worsens the challenges affected communities face. Massive decreases in population growth, economic productivity, education opportunities, and quality of healthcare are demonstrated by evidence from recent wars, particularly the conflict between Russia and Ukraine. These effects can cause long-term structural problems that can persist for decades, in addition to reversing immediate advancements in human development (EBRD, 2022).

Economic Impact of the United States

With an expenditure of $877 billion in 2022, which can be defined as nearly 40% of total spending on defence worldwide, the U.S. continues to be the most significant military spender in the world, as observed from Figure 5.1.1 by comparison among the regional expenditure for military in 2021 (SIPRI, 2023). Many contend that this spending came with the price for community ventures, even while stimulating economic activity in the defence industries. For instance, federal investment in healthcare and education has frequently lagged behind military spending, resulting in long-term opportunity costs (Stiglitz & Bilmes, 2008). Military Keynesianism promoted employment in the aerospace and defence industry during the Cold

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War but limited human capital development to a greater extent by prioritizing defence over civilian research and social welfare (Melman, 1974; Hooks, 1991).

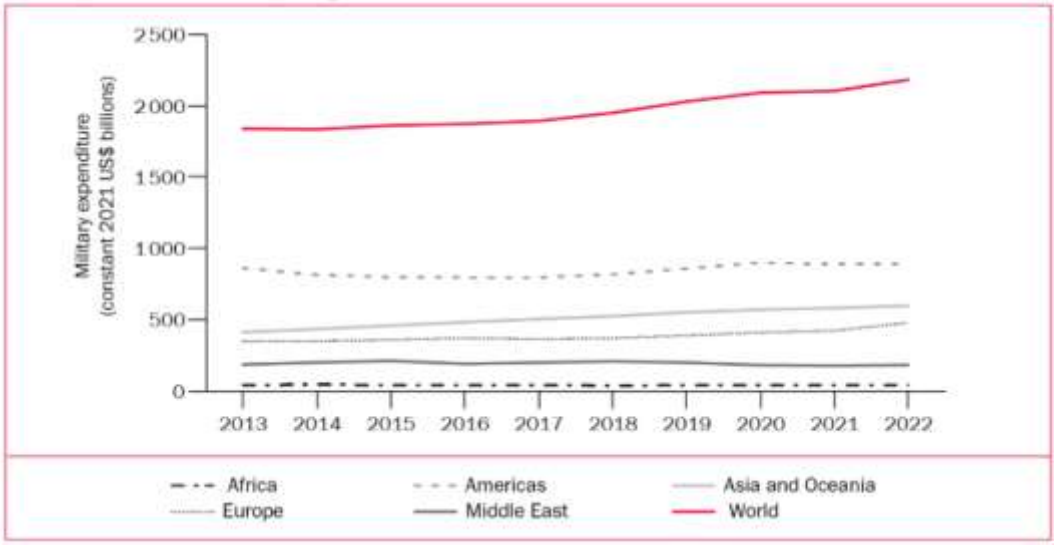

Figure 3: Military Expenditure by Region

Source:(SIPRI, 2023)

Health And Well-Being Impact of the United States

Once worldwide over a trendline towards the Cold War arm period (which was roughly from 1947 to 1991), the human well-being of the United States communities was considered suffering directly and indirectly, mainly when the nuclear testing was triggered. For instance, the massive defence expense causing the burden of countries, simultaneously negligence for the human benefit, such as inequality, hunger, disease and others unable to getting a better solution in this generation, particularly war race diverted the resources away from healthcare with military budgets consuming up to 9% of GDP compared to only 2 to 4% for health services (Russett, 1982). While the persistent risk of nuclear destruction produced enormous anxiety, depression, and mental health illnesses, the resulting imbalance left millions, especially marginalized people, with little access to healthcare (Boyd, 2011). The National Cancer Institute eventually found that radioactive fallout contributed to increased rates of thyroid cancer, significantly worsening the hazards associated with nuclear weapons testing (NCI, 1997). The overall era was characterized by underfunded health systems, psychological strain, and long-term environmental hazards, highlighting the human costs of placing military supremacy above domestic well-being, even though defence-driven innovations like nuclear medicine and advanced trauma care eventually benefited society (Garrett, 2015; Masco, 2006). The environmental implications of Cold War military operations also compromised human well-being in addition to these direct adverse health effects. With over 1,000 U.S. nuclear tests causing permanent radiation degradation at locations like Nevada, atomic weapons testing and defence-related sectors significantly deteriorated the environment (Masco, 2006). In addition to causing long-term ecological harm, these environmental dangers exposed the local population to radiation and tainted water sources, which caused significant health problems. Remedial and cleanup operations continue to be expensive, taking funds away from sustainable growth and the health of society.

Technology And Education Impact in the United States

Regarding the Cold War within arms race circumstances, the United States poured massive amounts of money into science, technology, and education to keep up with the Soviet Union.

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In response to the Soviet Union's launch of Sputnik in 1957, the National Defence Education Act (1958) was enacted, which invested heavily in math, science, and engineering programs to build a skilled workforce quickly. Military-backed research also gave rise to groundbreaking technologies like computers, semiconductors, nuclear energy, and even the early Internet (ARPANET) advancement that later shaped modern civilian life. While this focus strengthened America's global leadership in technology and boosted STEM education, it also came at a cost. Resources were funnelled toward defence-driven education and research, often leaving less funding for public schools, healthcare, and social programs. In short, the arms race fuelled innovation and education reform but also widened gaps in other areas of national well-being.

Health and Well-Being Impact on Russia

The arms race organized within the United States conflict with the Soviet Union, which Russia inherited as its successor state, effectively impacted the development of humanity in Russia. During the Cold War, the Soviet government devoted an unprecedented share of its national budget to nuclear weaponry, defence infrastructure, and military research, marshalling multiple financial, technological, and human resources. This overemphasis on military superiority took away important areas that directly promote human growth, such as health, education, housing, and social welfare. This resulted in millions of Russian civilians living in long-term shortages of basic consumer goods, overcrowded living conditions, and limited access to high-quality medical care, which all reduced the overall standard of living. This need to focus on defence meant that civilian scientific innovation was overshadowed by military-conducted research, thus limiting economic diversification and stifling technical progress in areas that could have improved everyday life. The military rivalry between the U.S. confront against the Soviet Union not only generate changing for the geology of the world but also placed a heavy burden on the human development of the Soviet system, in practice, transferring a significant part of the financial means to the military forces and blocking long-term progress in the spheres of education, health, and productivity (Ekonomi Pertahanan et al., 2024).

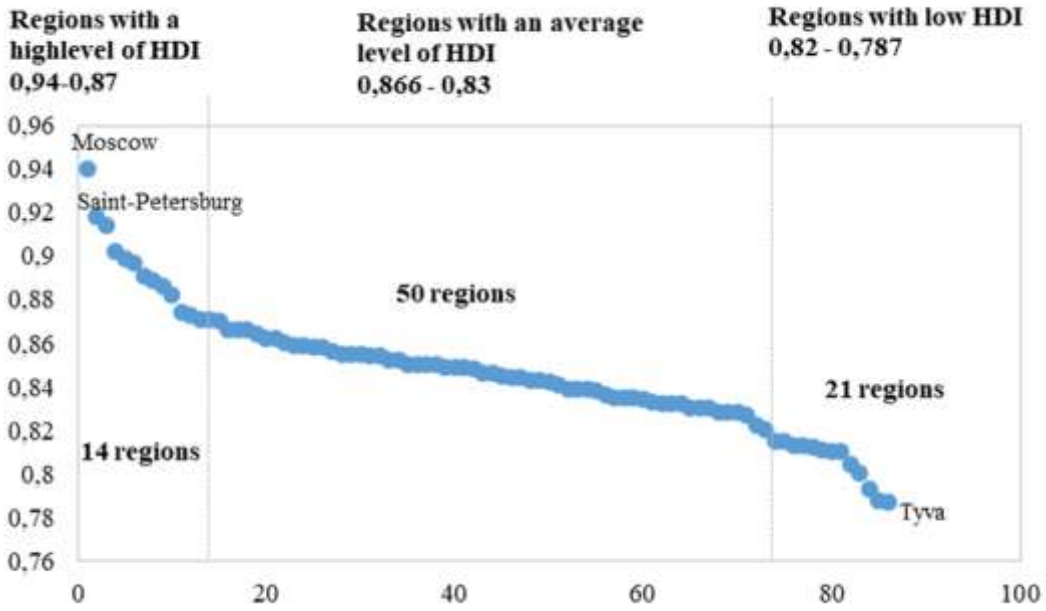

Figure 4 - Graph Shown Regions Between Levels of HDL

Source:(Irina Rakhmeeva, 2023)

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The figure illustrates the geographical differences in Human Development Index (HDI) across the entire Russia, identifying regions with a high HDI (0.94-0.87), regions with an average HDI (0.866-0.83), and regions with a low HDI (0.82-0.787). As the number shows, only 14 regions, such as Moscow or Saint Petersburg, have a high Human Development Index, which means they have strong economic results, high-quality healthcare, developed educational systems, and high living standards. On the contrary, most regions in Russia (50 regions) fall within the middle of the HDI spectrum, highlighting the inequalities in human development in the country. Also, 21 regions, such as Tyva (the last ranking), belong to the low HDI category, indicating significant barriers to accessing healthcare, education quality, infrastructure, and income.

The unequal distribution of human development is closely related to the economic policy adopted during and after the Cold War. The accumulation of the military-industrial complex in particular urban centres such as Moscow and Saint Petersburg resulted in permanent economic benefits to these centres. In contrast, peripheral and resource-dependent areas became structurally weak, poorly diversified, and lacking in developed human capital. Thus, Russia currently shows one of the most significant regional differences in human development among the large economies (Gorodnikova et al., 2021).

Economic Impact of Russia

Macro Footprint and Structure

Russia is a mid-sized global economy by nominal GDP but larger by purchasing power due to relative price levels and commodity base. IMF profiles place Russia's GDP at roughly $2–3 trillion (current USD) with a substantially higher PPP weight, underscoring its material though not dominant contribution to world output and trade. The structure is resource-intensive: hydrocarbons (crude oil, refined products, natural gas) anchor fiscal revenues and exports, while metals (nickel, palladium, aluminium), grains (notably wheat), and fertilizers provide additional global linkages. Recent trade data show leadership positions in wheat, nitrogenous fertilizers, and semi-finished iron (International Monetary Fund, 2023).

Global Spillovers and Human Development and Productivity Implications

Russia has a global footprint spanning oil, food, and metals markets. Refinery facility losses and oil exports have limited the availability of fuel in the region. Russia has become the world's biggest wheat exporter and a major supplier of fertilisers; European farmers' costs increased when the European Union imposed tariffs on Russian fertilisers in 2025. Similarly, restrictions on metals such as nickel and palladium will affect the automobile and battery industries worldwide (European Commission, 2025).

The expansion of the military economy endangers total factor productivity growth and reduces innovation within the civilian sectors. Russia has become stagnant regarding its human development index (HDI) relative to its peers. According to the UNDP, the long-term outlooks of the Human Development Index in the country are determined by the distribution of resources to healthcare, education, and innovation rather than defence (Connolly, R., 2022).

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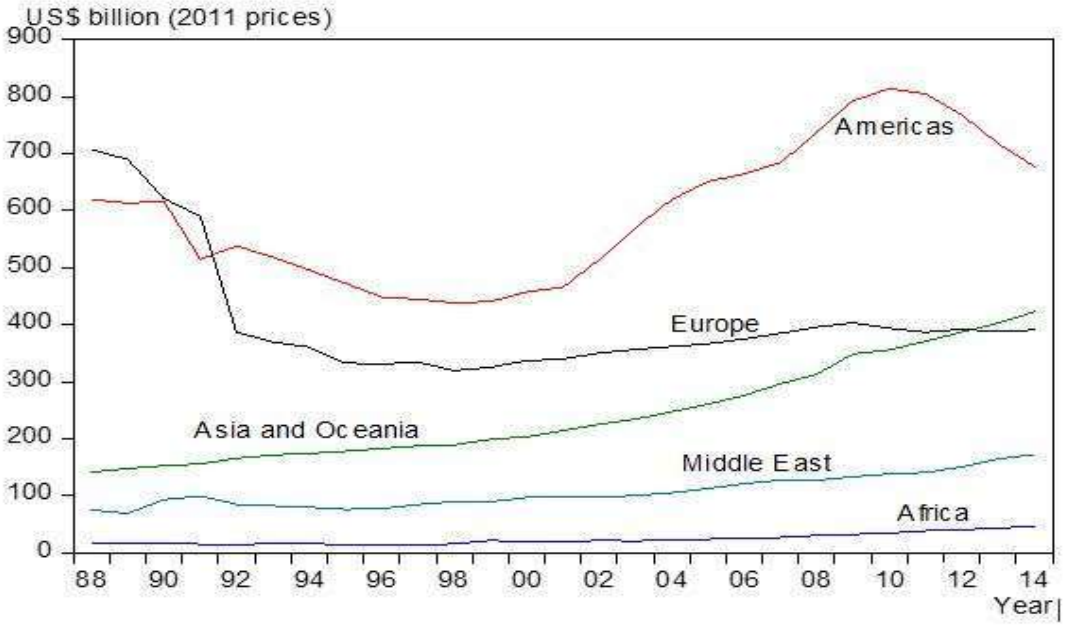

Figure 5: Trends in Global Military Expenditure by Region
Source: WTO International Trade Statistics

Health and Well-Being Impact of Russia

Russia is experiencing considerable health and well-being problems, mainly because of alcohol misuse, increased deaths as a result of lifestyle risk factors, a decrease in life expectancy because of COVID-19, and an acute shortage of personnel in the sector. An influential study conducted in Arkhangelsk, the so-called Know Your Heart cohort, has shown that the risk of mortality, both all-cause and cardiovascular, in heavy drinkers and those who are receiving treatment due to alcohol use disorders (narcology patients) is significantly higher, with hazard ratio values of 3.23 and 3.25, respectively (Mitkin et al., 2024). According to a longitudinal cohort based on the Russia Longitudinal Monitoring Survey, the three most risky factors were tobacco, alcohol use, and unhealthy nutrition, and hazard ratios were 3.52, 2.08, and 2.16, respectively (Egorova et al., 2024). The effect of the COVID-19 pandemic on survival outcomes was substantial: national estimates show that excess deaths in 2020 were 351,158, and in 2021 were 678,022, which led to the loss of an average of 2.0 years of life expectancy in 2020, and up to 14 years of potential life lost per single death (Aburto et al., 2022). Moreover, the lack of workforce in the healthcare system influences these outcomes even more. Despite legislative efforts, Russia continues to face a shortage of doctors, which can be explained by poor primary care systems and poor workforce planning, which impedes access to preventative and curative services (Sheiman, 2022).

Economic Constraints and Opportunity Costs

Economic constraints refer to people, businesses, or governments' limitations during resource allocation, such as capital, labour, time, or technology. Such limitations arise because resources are finite, whereas people's desires and society's needs are infinite. An example can be given of a government like Russia, which has to decide how to allocate its budget to areas like defence, healthcare, and education. However, it cannot maximize all areas simultaneously because of economic constraints. Those boundaries outline the scope of financial decision-making and require prioritizing specific goals above others (Mankiw, 2021). The most crucial concept due to these limitations is opportunity cost. It refers to the value of the next most preferred

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alternative to a decision made. When Russia intensifies military spending in an arms race, the opportunity cost can be reflected in reduced investment in healthcare and social welfare or infrastructure. This trade-off is an example of how pursuing one priority compromises another, highlighting the importance of evaluating the benefits and the trade-offs involved in economic choices (Varian, 2019).

Opportunity costs must be considered in macroeconomic policy, as they would allow policymakers to consider the long-term developmental impacts of short-term policies. To illustrate, in some cases but not all, augmented defence spending can contribute to the nation's safety; the opportunity cost may take the form of reduced development of human capital, growing inequality, or poorer health outcomes among the population. As a result, the financial constraints and opportunity costs create the conceptual context of understanding the best way to distribute scarce resources to improve social welfare when scarce resources exist (Krugman & Wells, 2020).

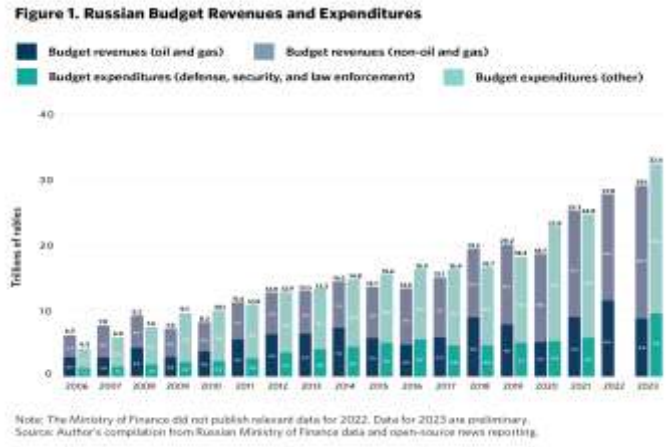

Figure 6: Russian Budget Revenues and Expenditures

Source: (Jacek Pera, 2023)

Comparative Analysis

The U.S. has consistently been the world's largest military spender, allocating nearly US$900–1,000 billion annually in recent years, representing about 3–3.5% of its GDP (SIPRI, 2025). Because of its large and diversified economy, this high absolute spending does not translate into the same relative fiscal burden as it does for smaller economies. Research shows that high-income states like the U.S. are often able to absorb military expenditure without severely reducing health or education budgets, owing to fiscal resilience and revenue diversification (Ikegami & Wang, 2023). Furthermore, U.S. defence research and development has historically generated significant civilian technology spillovers, such as advances in computing, aerospace, and the internet, which indirectly contribute to productivity and social development (Watterton, 2023). While the opportunity costs remain real, the United States' capacity to sustain military and welfare spending has lessened the immediate negative effects on human development compared to less wealthy nations (SIPRI, 2025).

In contrast, Russia's military expenditure is far more burdensome relative to its economic size, especially during and after the 2022 invasion of Ukraine. Defence spending surged to above 5–7% of GDP, absorbing a much larger share of government resources than in the United States (SIPRI, 2023). Unlike the U.S., Russia faces stricter fiscal constraints, meaning higher defence

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spending tends to come at the expense of health, education, and welfare budgets, thereby worsening long-term human development outcomes (Ikegami & Wang, 2023). Moreover, the opacity of Russia's wartime budget, with a growing portion of expenditure classified as "state secrets" makes it harder to ensure that social spending is protected (SIPRI, 2023) Sanctions and economic contraction further amplify the human development costs, as rising poverty and inequality undermine progress in healthcare access, education quality, and life expectancy (Njifen, 2023).

The United States can sustain its military dominance with limited immediate trade-offs for human development due to strong fiscal capacity and technological spillovers. Russia, however, bears a heavier human development cost, as high defence outlays consume scarce resources, reduce transparency, and directly displace social spending during wartime. Thus, the comparative analysis demonstrates that while both countries face opportunity costs, the burden is disproportionately higher in Russia because of structural economic weaknesses and wartime fiscal reallocation (Ikegami & Wang, 2023; SIPRI, 2023; SIPRI, 2025).

Conclusion

The Cold War arms race between the United States and the Soviet Union posed significant obstacles to human development in both societies. This era was marked by a large-scale redirection of resources toward military expansion, often at the expense of social and economic welfare. The result was a security paradox that attempted to strengthen national defence, ultimately undermining long-term social stability and economic resilience.

Although both nations faced similar challenges, their differing economic structures shaped distinct outcomes. In the Soviet Union, centralized planning prioritized defence production, leading to chronic neglect of consumer industries and public services. This underinvestment in healthcare, education, and social infrastructure contributed to declining living standards. The United States, despite operating within a market-driven system, also devoted extensive resources to defence, restricting federal investment in social programs and reinforcing inequalities in access to education and healthcare.

In both contexts, prioritizing military capability carried heavy opportunity costs for human development. Financial, technological, and human resources were diverted from sectors crucial for long-term progress, such as education, healthcare, and welfare. Consequently, both superpowers entered the post–Cold War era with structural weaknesses embedded in their social and economic systems. This historical case highlights that genuine national strength relies on military capacity and a nation's population's sustained development and well-being.

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