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MILITARY EXPENDITURES AND HEALTH OUTCOMES: A GLOBAL PERSPECTIVE

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ABSTRACT

Health has a major contribution in attaining better human capital and wellbeing both at the individual as well as at country levels. Although military spending may boost economic growth through multiplier and spillover effects, yet tradeoffs exist between military expenditures and health outcomes. Grossman (1972) explains health as output which depends on many input variables. By covering a panel of 156 countries ranging from the time period 1970 to 2014, this study incorporates military expenditures, GDP per capita, urbanization, access to the improved drinking water source, number of physicians, and secondary school enrollment as determinants of health (life expectancy and infant mortality). OLS, fixed effects, random effects, and system GMM have been used as estimation techniques. The study reveals that countries with low military expenditures have a comparatively high life expectancy and low infant mortality as compared to countries with high military expenditures. Robustness of results was checked through sensitivity analyses performed on the bases of determinants of health, international geopolitical scenario, and the development status of the country. The evidence of sensitivity analysis suggests that overall results are robust in the life expectancy model but somehow sensitive in case of infant mortality. The study affirms the explicit tradeoff between military expenditures and welfare spending and concludes that hefty defense expenditures lower life expectancy and enhance infant mortality.

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1. Introduction

Maintaining peace and prosperity is a matter of challenge for every state. Defense, education, and health are the foremost components of the state budget. Although it is perplexing to balance the pendulum between state security (defense) and economic development (education and health) yet defense (military expenditures)is the first urgency/priority. According to Levi (1988) military expenditures promote security and justice and evoke people to be obedient. The use of any resource in one sector creates an opportunity cost in other sectors of the economy

(Apostolakis, 1992). Trade-off situation prevails between military expenditures and health (Arif, Khan, & Raza, 2019; Caputo, 1975; Russett, 1969, 1982; Yildirim & Sezgin, 2002) as military spending reduces potential resources allocation for social progress. Nevertheless, developed economies experience a progressive impact of military spending on welfare and ambiguous results for emerging economies (Zhang, Liu, Xu, & Wang, 2017). However, a simple descriptive analysis of the data directs that countries with low average military expenditures have a comparatively high life expectancy and low infant mortality as compared to countries with high military expenditures.[1]

Health has a major contribution in attaining better human capital and well-being both at the individual as well as at country levels. Policies have achieved health efficiency as life expectancy has been upgraded from 54-71 years in 1960-2015 and infant mortality has been reduced from 102 to 24 per thousand live births during the same period. Nevertheless, huge inequalities in health are observed in descriptive analysis, the average range of life expectancy lies between 39.54-81.49[2] and average infant mortality ranges between 39.89-147.86 (Majeed & Gillani, 2017). These large health inequalities highlight a great challenge for policymakers and the importance of an effective and balanced budget to achieve the goal of health progress that has been placed at 3rd priority in the global development agenda (Sustainable Development Goals).

Perennial debates on the impact of military expenditures on economic growth and well-being remain uncertain. As there are a number of linkages through which military spending can affect economic growth and development in different ways. On one side, the positive effect has been observed in terms of cumulative employment, extension in technology (Benoit, 1973; Dunne & Nikolaidou, 2001; Hussain & kyung Sup, 2009; Thompson, 1974; T.-P. Wang, Shyu, & Chou, 2012; Yakovlev, 2007) and provision of national security (Dunne, Smith, & Willenbockel, 2005; Singer, Bremer, & Stuckey, 1972). On the other side, its adverse effects in terms of pulling out resources from productive segments of the economy have also been documented (Ali, 2007; Apostolakis, 1992; Caputo, 1975; Mylonidis, 2008; Sobek, 2010; Yildirim & Sezgin, 2002).

The real challenge for economists and policymakers is to reconnoiter an "adequate" volume of military spending. Every extra money spent above the necessary level is certainly a clear loss for the economy as a whole. Immanuel Kant, an influential philosopher, supports less military expenditures as more military is an insignia of wars (Singer et al., 1972), in this way curtailed resources are devoted to social spending. While, countries with more resources devoted towards military expenditures face fewer threats (Harris, 1970), have the ability to enforced policies (Bates & Bates, 2001) provide fewer opportunities for rebels (Hendrix, 2010; Sobek, 2010) and external conflicts (Braithwaite, 2010).

Extensive debates in the fields of sociology, political science, and economics remain uncertain regarding the impact of military expenditures on social well-being. It is a matter of question either military expenditures are a burden or blessing for development indicators. Therefore, predicting the net effect of defense spending on economic development is difficult and a matter of study. The present study will find the impact of military spending on health indicators (life expectancy and infant mortality) for the large panel dataset. This is the first attempt to find the endogeneity issue arises from bread versus butter phenomena by using external instruments. This study will address the following questions: Do military expenditures help to improve or

[1] On average, countries with Low military expenditures have high life expectancy (71.67) and low infant mortality (19.71) but countries with high military expenditures have low life expectancy (70.85) and high infant mortality (21.92). (Authors' own calculation)

[2] The statistics are calculated over the period 1960-2015.

deteriorate health performance? Either the impact of military expenditures on health outcomes is the same according to different income groups and environmental factors?

The organization of the paper is as follows: Section 2 describes the Literature Review methodology and data is presented in Section 3. Section 4 contains empirical results and the conclusion of the analysis is presented in Section 5.

2. Literature Review

In defense economics, the extensive literature links military expenditures with economic growth. Pioneer's work Benoit (1973) finds a significant relationship between military expenditures and economic growth. In a similar vein, military expenditures contribute to economic growth through investment, expansion in new technology and infrastructure (Dunne & Nikolaidou, 2001; Yakovlev, 2007; Yildirim & Sezgin, 2005). Whereas, using data from 1980 to 2010 for France, Malizard (2015) explores the negative impact of military expenditures on private investment (both compete for the same pool of resources). Therefore, no clear consensus has been established on the relationship between military expenditures and economic growth (Dunne et al., 2005).

Recent literate of military spending deals with demand for military spending (Markowski, Chand, & Wylie, 2017; Shaw, Horrace, & Vogel, 2005; Yesilyurt & Elhorst, 2017) and corruption (Goel & Saunoris, 2016). The peace dividend describes the relationship between military spending and democracy (Rota, 2011). While this relationship becomes complex as democracy provides chances of more regional conflicts. A negative relationship exists between military spending and democracy (Bove & Brauner, 2016; Eloranta, Andreev, & Osinsky, 2014). Democratic rulers, who wish to be reelected, perceive more incentive to increase social spending than military spending. Military regimes spend more on defense than civilian regimes.

Demand for public programs is more than existing resources so a trade off exists among different policy sectors. Caputo (1975) finds an explicit tradeoff between military and welfare spending. Using time-series data for Latin American countries from 1953 to 1987, Apostolakis (1992) confirms that military spending reduces potential resources allocation for social progress.

A huge strand of literature confirms that military spending deters development related to saving, investment, and Balance of payment (Deger & Sen, 1983). Russett (1969) explores the negative relationship between military expenditures and government spending on health and education for the US, France, and the UK. In later work, Russett (1982) finds no systematic tradeoff between military spending, health, and education for the period 1941-1982. Scheetz (1992) examines evolution for public expenditures for four Latin American countries from 1969-1987. He concludes that the growth of defense expenditure faster than health and education expenditures.

Yildirim and Sezgin (2002) examine the relationship between military and welfare spending (health and education) by using the Seemingly Unrelated Regression model (SUR) for Turkey from time period 1924-1996. Results confirm that military expenditures are positively related to education but negatively with health. Meanwhile in another study, Hirnissa, Habibullah, and Baharom (2009) investigate inter-relationship between military spending, education, and health for eight Asian countries. The results of ARDL do not find meaningful relationships except Malaysia and Sri Lanka. Restricted ECM confirms the existence of long run it might be more government funded research and development in military caused continuous imbalance, in result retard development. Alternatively, Benoit (1973) confirms that higher defense spending boost development in the third world. Domke, Eichenberg, and Kelleher (1983) find that tradeoff

between military and welfare is a long-run phenomenon rather than short-run in case of US, UK, Germany, and France.

A vast literature has analyzed the relationship of health with income (Filmer & Pritchett, 1999; Kabir, 2008; Rajkumar & Swaroop, 2008; Shaw et al., 2005; L. Wang, 2003), inequality (Asafu-Adjaye, 2004; Babones, 2008) and health expenditures (Bokhari, Gai, & Gottret, 2007; Dehn, Reinikka, & Svensson, 2003; Novignon, Olakojo, & Nonvignon, 2012; L. Wang, 2003). Similarly, the bulk of the literature has linked military expenditures with economic growth (Benoit, 1973; Chang, Fang, Wen, & Liu, 2001; Kusi, 1994; Safdari, Keramati, & Mahmoodi, 2011) and welfare spending (Deger, 1985; Eichenberg, 1984; Russett, 1982). However, many studies link military expenditures with health expenditures but ignore the direct impact of military expenditures on health indicators. Likewise, mostly literature on military expenditures deal with time series analysis and ignores panel analysis. This study finds the impact of military expenditures on health indicators (life expectancy and infant mortality) by covering a large sample size spanning over 1970-2015. The endogeneity issue arises due to the gun vs. butter phenomenon. In addition, we tackle the endogeneity issue by using appropriate instruments.

3. Theoretical Framework

The role of military expenditures on the economy can be described in three continuums[3] (Dunne et al., 2005). First, from the demand side: an additional increment in military spending may boost economic growth through multiplier effects or may suppress growth by crowding out. Second, from supply-side: military spending results in the development of technology which boosts growth through spillover effects (Yakovlev, 2007) conversely, it causes the opportunity cost of other sectors (Chang et al., 2001). Third, from the security side: the secure milieu provides incentives to accumulate capital which leads to higher growth (Thompson, 1974).

Life expectancy and infant mortality are the most suitable indicators of health particularly for the cross country investigation (Babones, 2008; Saunders, 1996). For the current analysis, life expectancy and infant mortality (proxies of health) are taken as dependent variables and military expenditure is taken as an independent variable. The main focused variable is military expenditures. Grossman (1972) considers health as a utility function that depends on the initial stock of health and also on the medical care in which the individual invests over time. Human born with a specific stock of health which depreciates with time and death take place as this stock of health is minimized. Grossman (1972) enlightens the Health Production Function (HPF) of a country that requires an input output association. Health is considered output which ultimately depends on many input variables.

This study also incorporates some demographic and infrastructural variables, like, urbanization, the population having access to the improved water source, number of physicians per thousand people, as determinants of health Urbanization has a dual impact (positive and negative) on health. Positively, urbanization can provide access to jobs, education, health services (Godfrey & Julien, 2005; Gupta, Verhoeven, & Tiongson, 2002). Negatively, more trend of urbanization creates the issue of overcrowdedness which creates social and economic deprivations (Rogers & Wofford, 1989). Access to improve and freshwater has a productive impact on health (Cingolani, Thomsson, & De Crombrugghe, 2015; Majeed & Gillani, 2017; Shafiq & Gillani, 2018). Operative immunization agendas can be a focal point against reducing a cluster of viruses. Effective immunization programs play a vital role in reducing infant mortality and boosting life expectancy (Cingolani et al., 2015; Gupta et al., 2002).

[3] See Figure 1

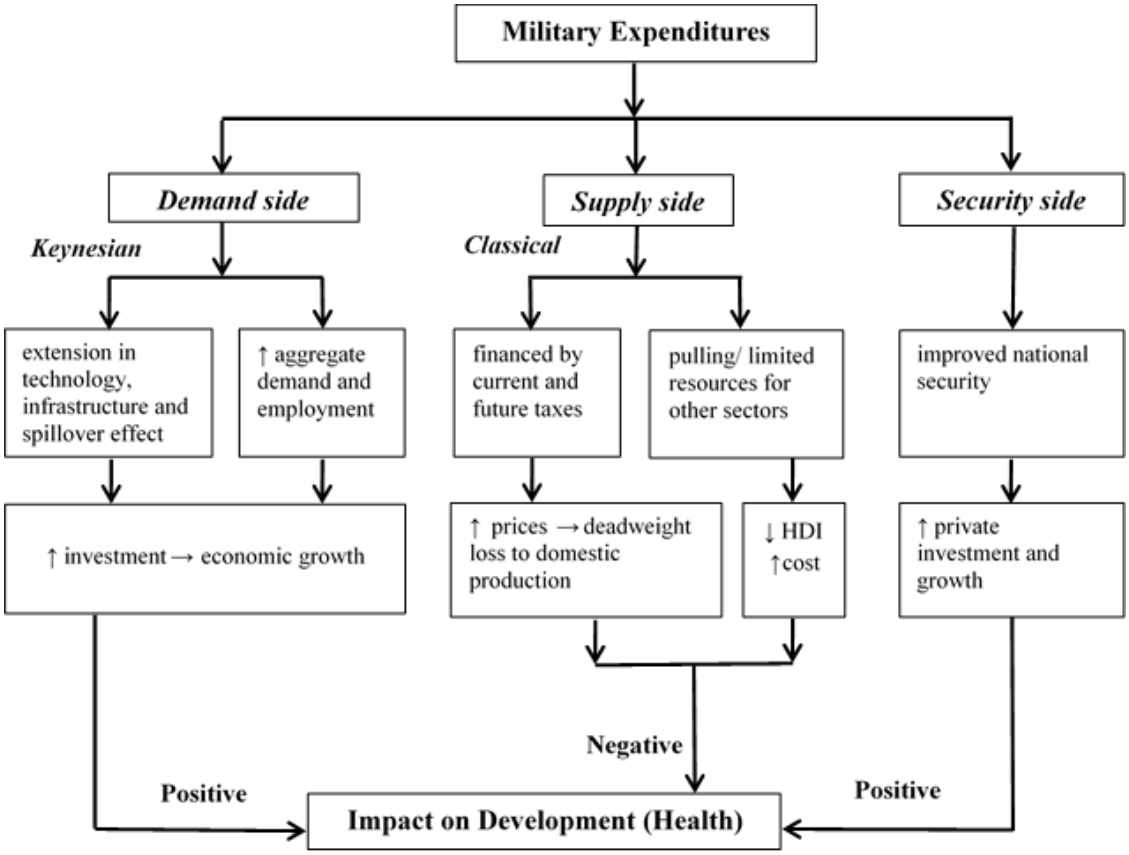

Figure 1: Military expenditures and its relation to Health

Education (as a social determinant) ensures improvement in health status. As money has a psychological influence on health (Wilkinson & Pickett, 2006) or income can access towards basic health facilities (Cingolani et al., 2015; Filmer & Pritchett, 1999; Kabir, 2008; Rajkumar & Swaroop, 2008; Skogstad et al., 2016; L. Wang, 2003). So, GDP per capita serves as an economic determinant of health.

4. Data and Methodology

4.1 Model Specification

The validity of providing all facilities to its citizens is the core purpose of the state. Hence, the state faces many challenges to balance its budget between national security and economic development. The utilization of resources in one sector creates opportunity costs for other sectors of the economy (Apostolakis, 1992). So its matter of discussion how military expenditures affect the health sector mainly infant mortality and life expectancy. The econometric modeling of the present study is based on Grossman (1972) healthcare theory which considers health outcomes as a function of different factors. In the following set of equations, we move from a mathematically more general model for health toward econometrically more specific models. i.e.

$$Health\ outcome = f\ (input\ variables) \quad (1)$$

Otherwise,

$$Health\ outcome = f\ (economic\ factors,\ social\ factors,\ demographic\ factors\ ) \quad (2)$$

i.e., life expectancy (*LEXPECT*) has been modeled as follows:

$$LEXPECT_{it} = \propto_0 + \propto_1 MILITEXP_{it} + \propto_2 PCGDP_{it} + \propto_3 PHYCIAN_{it} + \propto_4 IMPWTER_{it} + \propto_5 SENROL_{it} + \propto_6 URBNPOP_{it} + \varepsilon_{it} \quad (3)$$

Likewise, infant mortality (*INFMORT*) has been modeled as the function of the same explanatory variables as in the above model (3)

$$INFMORT_{it} = \beta_0 + \beta_1 MILITEXP_{it} + \beta_2 PCGDP_{it} + \beta_3 PHYCIAN_{it} + \beta_4 IMPWTER_{it} + \beta_5 SENROL_{it} + \beta_6 URBNPOP_{it} + \varepsilon_{it} \quad (4)$$

Here, the output reflects health indicators which are generally measured through life expectancy and infant mortality. Input variables consist of economic factors: military expenditures (*MILITEXP*) and GDP per capita (*PCGDP*), social factors: number of physicians per thousand people (*PHYCIAN*), the population having access to improved water source (*IMPWTER*) and secondary school enrollment (*SENROL*), and demographic factor: urban population growth rate (*URBNPOP*).

By covering a panel of 156 countries ranging from the period 1970 to 2014, this paper studies life expectancy and infant mortality to measure the insight of individual health. For health variables, the study has taken data from (WDI, 2015). Usually, health indicators do not respond too fast to any organizational changes and changes in health outcomes can be observed over a number of years not yearly that why this study uses five-year interval data for the analysis.

4.2 Choice of Instruments and the Estimation Techniques

OLS, fixed effects, random effects, and system GMM have been used as estimation techniques by using life expectancy as health proxy. System GMM technique is used to deal with endogeneity that arises from butter versus gun situation. In this study, endogenous variable military expenditures are instrumented by economic, geographic, and political instruments. The first economic instrument is industrialization as Industrial countries have 55% of world military expenditures (Hewitt, 1992). Correspondingly, industrialized countries spend more on military expenditures i.e. relatively high industrial production (enough domestic surplus), in return a country may be tempted to upsurge military expenditures (Deger & Sen, 1983; Maizels & Nissanke, 1986). Second, the lagged military spending considers as a significant and robust determinant of military expenditures (Goldsmith, 2003; Looney & Frederiksen, 1986; Yakovlev, 2007). The geographical instrument, such as land area has a strong influence on the level of military expenditures (Hewitt, 1992). Subsequently, widely held belief, a larger country has higher military expenditures as compared to a smaller country, even though the main concern involved in defense is indistinguishable.

Finally, the political instrument includes military expenditures of neighboring countries, as the level of military expenditure selected by a government might, to an extent, be motivated by the level selected by its neighbors (Hewitt, 1992; Maizels & Nissanke, 1986; Sun & Yu, 1999). The neighborhood arms race arises as a result of negative externality (Pakistan and India, which creates threat and security pressure for neighbors. Another understanding of the same prodigy is that governments, in the absenteeism of strong gauges of military need, base their decision regarding the level of military expenditures on the behavior of their neighbors (Dunne & Perlo-Freeman, 2003). Before proceeding towards estimations, we have applied some diagnostic tests. Results of the link test, VIF test, and Breusch-Pagan test indicate that model is correctly specified, there are no traces of multicollinearity but heteroscedasticity prevails.

5. Results and Discussion

In this section, we provide the empirical results obtained from panel data for 156 countries over the time period 1970 to 2014. Table 1 presents estimation results obtained from OLS, fixed effects, random effects, and system GMM by using life expectancy as health proxy. Columns 1 to 3 direct that military expenditures hurt life expectancy. As, Apostolakis (1992) argues that one sector resource usage creates opportunity cost for other sectors. In the same way, an explicit tradeoff exists between military and welfare spending (Apostolakis, 1992; Caputo, 1975). Hefty defense expenditures retard health programs (Dabelko & McCormick, 1977; Peroff & Podolak-Warren, 1979; Russett, 1969; Stein & Stein, 1980). Less attention to the health sector causes a negative influence on life expectancy.

Table 1A in the appendix shows the effect of military expenditures on health using infant mortality as a health proxy. Hausman test suggests that the fixed effect as compared to random effect is more appropriate. Its coefficient indicates that with a 1 unit increase in military spending, life expectancy will decrease by 0.273 units. In our model, the problem of endogeneity is likely to arise due to simultaneous linkages (trade-off effect) between military spending and health and there could be the problem of omitted variable bias. In order to avoid endogeneity which causes spurious OLS results, this study practices the system GMM method by using a lag of independent variable and external instruments.

Column 4 reports results of system GMM to indicate that military expenditures have a significantly negative impact on life expectancy as larger military expenditures associating with more security (Dunne et al., 2005), improves economic growth (Benoit, 1973) through extension in technology (Yakovlev, 2007)and spillover effects promotes health performance (Cingolani et al., 2015). Panel results show an insignificant impact of military expenditures.

Table 1
Results of Health and Military Expenditures

	Dependent Variable: Life Expectancy			
VARIABLES	**OLS**	**Fixed Effects**	**Random Effects**	**System GMM**
Military Expenditures	-0.000632	-0.273***	-0.261***	-0.268*
	(0.102)	(0.0788)	(0.0737)	(0.143)
Improved water	0.148***	0.117***	0.151***	-0.112
	(0.0192)	(0.0235)	(0.0200)	(0.0952)
Physicians	1.496***	1.034***	1.437***	3.255***
	(0.219)	(0.294)	(0.239)	(0.883)
Education	0.0707***	0.0606***	0.0560***	0.0436
	(0.0119)	(0.0101)	(0.00926)	(0.0406)
Urbanization	-0.138	0.485***	0.378***	1.702***
	(0.138)	(0.105)	(0.0987)	(0.435)
Log GDP per Capita	2.486***	4.276***	3.119***	-0.731
	(0.200)	(0.517)	(0.296)	(0.501)
Lag.Life Expectancy				1.063***
				(0.141)
Constant	26.51***	15.68***	21.99***	-0.519
	(1.525)	(3.461)	(1.941)	(4.594)
Observations	632	632	632	519
R-squared	0.762	0.527		
Number of coding		154	154	134
Functional form test	0.902			AR(1) 0.534
Multicollinearity test	2.30			AR(2) 0.585
Heteroscedasticity test	0.0000			Hansen 0.097

"*Note:* Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1"

Regarding control variables, the population having access to improved water sources and the number of physicians per thousand people have a positive and significant effect on life expectancy. There exists an adverse relationship between urban population growth and life expectancy. Such a relationship is reliable with second fold phenomena of urbanization as explained by (Rogers & Wofford, 1989).

Education is fortunate for health as it enables an educated person to enjoy a healthy life. Perfect knowledge about health originates from better education (Chong & Calderon, 2000; Drabo, 2010; Mondal, Hossain, & Ali, 2009). This study finds that the impact of GDP per capita is positive on life expectancy. GDP growth has a positive impact on health performance as indicated by many studies (Bayati, Akbarian, & Kavosi, 2013; Messias, 2003). In short military spending harms life expectancy. All control variables have a significant positive impact on life expectancy except urbanization.

5.2 Sensitivity Analysis

To check the robustness of results, this study includes some other determinants of health in the sensitivity analysis. Based on the determinants of health, the international geopolitical scenario, and the development status of the country, the current study splits sensitivity analyses into three parts. Table 2 shows the results of sensitivity analysis for life expectancy in the presence of other determinants of life expectancy. It is observed that the results of military spending are insensitive in the presence of improved sanitation, population growth, and immunization and health expenditures. The original model is represented in column 1. Detailed results are mentioned in the appendix. Many variations have been observed in the case of infant mortality. Infant mortality is sensitive in the presence of population growth and immunization (see appendix, Table 4A).

Table 2
Sensitivity Analysis of Life Expectancy (Health determinants)

	Dependent Variable: Life Expectancy			
Variables	**1**	**2**	**3**	**4**
Military Expenditures	-0.230***	-0.274***	-0.247***	-0.398***
	(0.0802)	(0.0785)	(0.0769)	(0.120)
Improved Sanitation	0.0726***			
	(0.0280)			
Population Growth		0.465**		
		(0.226)		
Immunization			0.0693***	
			(0.0135)	
Health Expenditures				0.388***
				(0.0806)

Table 3 represents the sensitivity of life expectancy according to the international geopolitical scenario. Column1 indicates 96 countries having less than average military expenditures (2.46). Similarly, column 2 represents 64 countries having military expenditures more than average. Column 3 indicates the impact of military expenditures on life expectancy by excluding 20 Organizational for Economic Co-operation and Development (OECD) countries. Columns 4 and 5 represent the impact of the military expenditure before and after the 9/11 incident respectively. The more adverse effect is observed after 9/11[4]. Results are sensitive in case of infant mortality.

[4]https://www.nationalpriorities.org/campaigns/how-military-spending-has-changed/

Table 3
Sensitivity Analysis of Life Expectancy (International Political Milieu)

Dependent Variable: Life Expectancy					
	1	2	3	4	5
	The level of military expenditures		Incidence of a terrorist event		Excluding OECD
Variable	Less than average	More than average	Before 9/11	After 9/11	
Military Expenditures	-0.446** (0.227)	-0.255** (0.0991)	-0.0259** (0.0104)	-0.196** (0.0787)	-0.282*** (0.0866)

Table 4 shows sensitivity analysis according to the development status of the country. Variation is observed but comparatively high in the case of upper-income countries. Again, results are sensitive in case of infant mortality.

Table 4
Sensitivity Analysis of Life Expectancy (Country's development status)

Dependent Variable: Life Expectancy				
	1	2	3	4
Variable	Lower Income countries	Lower middle-Income countries	Upper-Income countries	Upper middle-Income countries
Military Expenditures	-1.628*** (0.479)	-0.168* (0.0975)	-0.348*** (0.0964)	-0.0762 (0.213)

6. CONCLUSION

Growth is powerfully associated with better health is neither astonishing nor new (Bhargava, Jamison, Lau, & Murray, 2001). Foremost components of the state budget are health, military expenditures, and education. This study finds the impact of military spending on health performance by taking life expectancy and infant mortality as proxies of health. To achieve this objective we have used panel data on 156 countries from time period 1970-2014. In the light of careful estimated resulted obtained from OLS, fixed & random effects, and System GMM, we can address the questions which arose in the first section. The results indicate that the overall impact of military spending on health performance is negative for life expectancy and positive for infant mortality and also significant in panel data analysis. Through sensitivity analysis, we find that overall the results are robust in the case of life expectancy while somehow sensitive in case of infant mortality.

Its duty of the state to keep a balance between gun and butter. For this instance, laws should be developed at the international level in order to save a country from external risks. Strong institutions may play a vital role in controlling internal threats, ultimately resources will deliver to required sectors efficiently.

The recent compilation has certain limitations. So far, many queries remain open. This study shows the overall impact of military spending on life expectancy and infant mortality for a large panel dataset. However, many country-specific variables may affect military spending and health indicators. Particularly results revealed from sensitivity analysis suggest that future analyses should be country-specific. Future work can incorporate the role of aid to discover either it is beneficial for military spending or health at the same time. Future studies can also analyze the impact of military spending by incorporating environment and development level influence to gauge better direction and policy implications for specific-county and region.

Conflict of Interests/Disclosures

The authors declared no potential conflicts of interest w.r.t the research, authorship and/or publication of this article.

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Appendix
Table 1A
Results of Infant Mortality and Military Expenditures

	Dependent Variable: Infant Mortality			
VARIABLES	**OLS**	**Fixed Effects**	**Random Effects**	**System GMM**
Military Expenditures	-0.239	0.349	0.403*	0.560*
	(0.276)	(0.253)	(0.236)	(0.300)
Improved water	-0.663***	-0.954***	-0.961***	-0.830***
	(0.0520)	(0.0753)	(0.0621)	(0.184)
Physicians	-1.769***	1.541	-0.422	0.0637
	(0.593)	(0.944)	(0.737)	(1.769)
Education	-0.406***	-0.382***	-0.376***	-0.241***
	(0.0322)	(0.0322)	(0.0294)	(0.0567)
Urbanization	1.891***	-0.617*	-0.0739	-1.106
	(0.374)	(0.336)	(0.315)	(0.707)
Log GDP per Capita	-6.832***	-12.32***	-7.555***	1.400
	(0.541)	(1.657)	(0.874)	(1.075)
Lag. Infant Mortality				0.494***
				(0.0741)
Constant	184.6***	249.3***	213.8***	97.75***
	(4.130)	(11.09)	(5.724)	(19.31)
Observations	632	632	632	519
R-squared	0.838	0.722		
Number of coding		154	154	134
Functional form test	0.450			AR(1) 0.088
Multicollinearity test	2.30			AR(2) 0.563
Heteroscedasticity test	0.0000			Hansen 0.049

"*Note:* Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1"

Table 2A
Correlation Matrix between Health, Military expenditures and Control Variables

	1	2	3	4	5	6	7	8
1. Life Expectancy	1							
2. Infant Mortality	-0.9567	1						
3. Military Expenditures	0.0408	-0.0186	1					
4. Improved Water	0.8621	-0.8586	0.0778	1				
5. Physicians	0.7216	-0.6972	0.0321	0.6158	1			
6. Education	0.6248	-0.6811	-0.0591	0.5775	0.4494	1		
7. Urbanization	-0.6790	0.6724	0.2697	-0.5852	-0.7054	-0.4524	1	
8 GDP Per Capita	0.6077	-0.5851	0.0679	0.5258	0.4422	0.2790	-0.2830	1

Table 3A
Health Performanceand Military Expenditures: Data

Variable	Definition / Description	Source and Observation	Mean	Standard deviation	Minimum	Maximum
Dependent Variables (Health Performance)						
Life expectancy	Life expectancy at birth, total (years)	WDI, 156 (1970-2015)	64.30	10.14	39.54	78.86
Infant mortality	Mortality rate, infant (per 1,000 live births)	WDI, 156 (1970-2015)	50.20	37.71	5.31	147.86
Independent Focused Variables (Military expenditures)						
Military expenditures	Tax revenue (% of GDP)	WDI, 156 (1970-2015)	2.46	1.98	0.086	13.68
Control Variables						
Improved Water	Improved water source (% of population with access)	WDI, 156 (1970-2015)	82.46	18.09	33.79	100
Physicians	Physicians (per 1,000 people)	WDI, 156 (1970-2015)	1.35	1.26	.021	4.32
Education	Total enrollment in secondary education, regardless of age, expressed as a percentage of the population of official secondary education age.	WDI, 156 (1970-2015)	91.69	20.75	26.90	142.60
Urbanization	Urban population growth (annual %)	WDI, 156 (1970-2015)	2.91	1.87	-0.10	8.57
GDP per capita	GDP per capita (constant 2005 US$)	WDI, 156 (1970-2015)	8209.17	12541.93	167.08	56382.94
Instrumental Variables						
Industrial countries dummy	1= industrial country 0= non-industrial country					
Land area	sq. kmWDI					
Lagged military spending & Neighboring countries	military spending					

Author's own calculations

Table 4A
Sensitivity Analysis of Infant Mortality (Determinants)

Dependent Variable: Infant Mortality				
Variables	**1**	**2**	**3**	**4**
Military Expenditures	0.756***	0.487	0.199	0.998**
	(0.288)	(0.321)	(0.361)	(0.425)
Improved Sanitation	-0.230*			
	(0.120)			
Population Growth		7.745***		
		(2.625)		
Immunization			-0.418**	
			(0.186)	
Health Expenditures				2.338
				(1.496)

Table 5A
Sensitivity Analysis of Infant Mortality (Environment)

Dependent Variable: Infant Mortality					
	1	**2**	**3**	**4**	**5**
Variable	**Less than average**	**More than average**	**Excluding OECD**	**Before 9/11**	**After 9/11**
Military Expenditures	1.982**	0.389	0.446*	0.0596	0.395*
	(0.875)	(0.255)	(0.270)	(0.0390)	(0.234)

Table 6A
Sensitivity Analysis of Infant Mortality (Development level)

Dependent Variable: Infant Mortality				
	1	**2**	**3**	**4**
Variable	**Lower Income countries**	**Lower middle Income countries**	**Upper Income countries**	**Upper middle Income countries**
Military Expenditures	3.209*	0.480	0.169	0.191
	(1.832)	(0.382)	(0.187)	(0.473)

Table 7A
Sensitivity Analysis for Life Expectancy and Infant mortality (Detailed table of Determinants)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	***Dependent Variable: Life Expectancy***				***Dependent Variable: Infant Mortality***			
Military Expenditures	-0.230***	-0.274***	-0.247***	-0.398***	0.756***	0.487	0.199	0.998**
	(0.0802)	(0.0785)	(0.0769)	(0.120)	(0.288)	(0.321)	(0.361)	(0.425)
Improved water	0.0848***	0.117***	0.0748***	0.143***	-0.683***	-0.841***	-0.565**	-1.451***
	(0.0267)	(0.0234)	(0.0243)	(0.0220)	(0.194)	(0.231)	(0.229)	(0.377)
Physicians	0.0619***	0.0588***	0.0467***	0.0354***	2.153	-0.875	-0.00592	1.410
	(0.0101)	(0.0101)	(0.0102)	(0.00878)	(2.024)	(2.003)	(1.950)	(3.216)
Education	0.978***	0.992***	1.074***	0.906***	-0.283***	-0.174**	-0.0987	-0.325***
	(0.299)	(0.294)	(0.287)	(0.277)	(0.0550)	(0.0749)	(0.0926)	(0.122)
Urbanization	0.547***	0.146	0.486***	0.200**	-0.944*	-7.907***	-0.414	0.143
	(0.107)	(0.195)	(0.102)	(0.0866)	(0.565)	(2.413)	(0.864)	(0.823)
Log GDP per Capita	3.723***	4.272***	4.018***	3.918***	3.138**	0.642	0.727	0.575
	(0.556)	(0.515)	(0.506)	(0.449)	(1.503)	(1.408)	(1.201)	(2.623)
Improved Sanitation	0.0726***				-0.230*			
	(0.0280)				(0.120)			
Population Growth		0.465**				7.745***		
		(0.226)				(2.625)		
Immunization			0.0693***				-0.418**	
			(0.0135)				(0.186)	
Health Expenditures				0.388***				2.338
				(0.0806)				(1.496)
Constant	17.52***	16.02***	16.66***	17.57***	87.28***	102.2***	102.9***	154.5***
	(3.518)	(3.453)	(3.377)	(2.971)	(20.50)	(23.75)	(20.90)	(39.19)
Observations	624	632	632	507	518	519	519	431

"*Note:* Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1"

Table 8A
Sensitivity Analysis for Life Expectancy and Infant mortality (Detailed table of Environment)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Less than average	***More than average***	***Excluding OECD***	***Before 9/11***	***After 9/11***	***Less than average***	***More than average***	***Excluding OECD***	***Before 9/11***	***After 9/11***
VARIABLES	***Dependent Variable: Life Expectancy***					***Dependent Variable: Infant Mortality***				
Military Expenditures	-0.446**	-0.255**	-0.282***	-0.0259**	-0.196**	1.982**	0.389	0.446*	0.0596	0.395*
	(0.227)	(0.0991)	(0.0866)	(0.0104)	(0.0787)	(0.875)	(0.255)	(0.270)	(0.0390)	(0.234)
Improved water	0.140***	0.190***	0.128***	0.149***	0.210***	-1.059***	-0.878***	-0.930***	-1.202***	-1.100***
	(0.0217)	(0.0500)	(0.0263)	(0.0202)	(0.0284)	(0.0799)	(0.104)	(0.0718)	(0.0762)	(0.0844)
Physicians	0.0422***	0.0922***	0.0629***	0.0175**	0.0163	-0.350***	-0.328***	-0.364***	-0.100***	-0.144***
	(0.00985)	(0.0198)	(0.0111)	(0.00814)	(0.00996)	(0.0372)	(0.0497)	(0.0335)	(0.0304)	(0.0296)
Education	1.264***	0.979*	0.463	0.812***	0.618***	-0.0879	-0.0536	-0.465	-0.231	0.367
	(0.283)	(0.518)	(0.428)	(0.188)	(0.161)	(1.033)	(1.042)	(0.964)	(0.546)	(0.478)
Urbanization	0.523***	0.380**	0.503***	-0.0241	0.0145	-0.891	0.342	-0.0679	0.374*	-0.0305
	(0.149)	(0.152)	(0.118)	(0.0541)	(0.0721)	(0.569)	(0.383)	(0.367)	(0.203)	(0.214)
Log GDP per Capita	3.816***	2.270**	3.637***	3.809***	3.864***	-7.525***	-8.075***	-9.227***	-6.498***	-11.24***
	(0.347)	(0.989)	(0.580)	(0.361)	(0.444)	(1.152)	(1.425)	(1.184)	(1.323)	(1.320)
Constant	18.43***	23.59***	20.72***	21.76***	17.04***	218.9***	202.8***	221.5***	198.7***	230.4***
	(2.511)	(5.920)	(3.573)	(2.921)	(3.004)	(8.386)	(8.987)	(7.143)	(10.82)	(8.927)
Observations	386	235	491	719	589	386	235	491	722	589

"*Note:* Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1"

Table 9A
Sensitivity Analysis for Life Expectancy and Infant mortality (Detailed table of Development level)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lower Income countries	***Lower middle Income countries***	***Upper Income countries***	***Upper middle Income countries***	***Lower Income countries***	***Lower middle Income countries***	***Upper Income countries***	***Upper middle Income countries***
VARIABLES	***Dependent Variable: Life Expectancy***				***Dependent Variable: Infant Mortality***			
Military Expenditures	-1.628***	-0.168*	-0.348***	-0.0762	-0.238	-0.640	-0.460***	1.793**
	(0.479)	(0.0975)	(0.0964)	(0.213)	(1.602)	(0.599)	(0.134)	(0.699)
Improved water	0.117**	0.146***	0.196***	0.144***	-0.422***	-0.339***	-1.490***	-1.254***
	(0.0555)	(0.0367)	(0.0619)	(0.0458)	(0.143)	(0.0961)	(0.0855)	(0.119)
Physicians	0.0634***	0.0544***	0.0233	0.0241	-0.416***	-0.533***	0.0923*	-0.116
	(0.0233)	(0.0173)	(0.0245)	(0.0276)	(0.0660)	(0.0728)	(0.0533)	(0.104)
Education	20.35*	1.018*	1.284***	1.621***	-24.35	-3.227*	0.589*	-2.089**
	(11.97)	(0.599)	(0.198)	(0.584)	(35.36)	(1.805)	(0.313)	(0.881)
Urbanization	1.100**	0.806***	0.0274	0.745***	0.313	2.858**	0.520***	0.170
	(0.452)	(0.256)	(0.0730)	(0.234)	(1.668)	(1.161)	(0.169)	(0.838)
Log GDP per Capita	1.658	3.488***	5.057***	2.749***	-10.58**	-13.04***	-2.759***	-5.078**
	(1.945)	(0.925)	(0.499)	(0.813)	(5.276)	(2.650)	(0.477)	(1.957)
Constant	27.73**	20.94***	2.289	27.61***	203.0***	213.5***	171.1***	191.3***
	(10.89)	(5.109)	(5.861)	(5.761)	(32.01)	(18.16)	(7.878)	(17.84)
Observations	96	168	206	164	96	168	206	164

"Note: Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1"

Table 10A
List of Countries

1	Afghanistan	33	Croatia	65	Iran, Islamic Rep.	97	Montenegro	129	Spain
2	Albania	34	Cuba	66	Iraq	98	Morocco	130	Sri Lanka
3	Algeria	35	Cyprus	67	Ireland	99	Mozambique	131	Sudan
4	Angola	36	Czech Republic	68	Israel	100	Namibia	132	Swaziland
5	Argentina	37	Denmark	69	Italy	101	Nepal	133	Sweden
6	Armenia	38	Djibouti	70	Jamaica	102	Netherlands	134	Switzerland
7	Australia	39	Dominican Republic	71	Japan	103	New Zealand	135	Syrian Arab Republic
8	Austria	40	Ecuador	72	Jordan	104	Nicaragua	136	Tajikistan
9	Azerbaijan	41	Egypt, Arab Rep.	73	Kazakhstan	105	Niger	137	Tanzania
10	Bahrain	42	El Salvador	74	Kenya	106	Nigeria	138	Thailand
11	Bangladesh	43	Equatorial Guinea	75	Korea, Rep.	107	Norway	139	Timor-Leste
12	Belarus	44	Estonia	76	Kuwait	108	Oman	140	Togo
13	Belgium	45	Ethiopia	77	Kyrgyz Republic	109	Pakistan	141	Trinidad and Tobago
14	Belize	46	Fiji	78	Lao PDR	110	Panama	142	Tunisia
15	Benin	47	Finland	79	Latvia	111	Papua New Guinea	143	Turkey
16	Bolivia	48	France	80	Lebanon	112	Paraguay	144	Turkmenistan
17	Botswana	49	Gabon	81	Lesotho	113	Peru	145	Uganda
18	Bulgaria	50	Gambia, The	82	Liberia	114	Philippines	146	Ukraine
19	Burkina Faso	51	Georgia	83	Libya	115	Poland	147	United Arab Emirates
20	Burundi	52	Germany	84	Lithuania	116	Portugal	148	United Kingdom
21	Cabo Verde	53	Ghana	85	Luxembourg	117	Qatar	149	United States
22	Cambodia	54	Greece	86	Macedonia, FYR	118	Romania	150	Uruguay
23	Cameroon	55	Guatemala	87	Madagascar	119	Russian Federation	151	Uzbekistan
24	Canada	56	Guinea	88	Malawi	120	Rwanda	152	Venezuela, RB
25	Central African Republic	57	Guinea-Bissau	89	Malaysia	121	Saudi Arabia	153	Vietnam
26	Chad	58	Guyana	90	Mali	122	Senegal	154	Yemen, Rep.
27	Chile	59	Haiti	91	Malta	123	Serbia	155	Zambia
28	China	60	Honduras	92	Mauritania	124	Seychelles	156	Zimbabwe
29	Colombia	61	Hungary	93	Mauritius	125	Sierra Leone		
30	Congo, Dem. Rep.	62	Iceland	94	Mexico	126	Slovak Republic		
31	Congo, Rep.	63	India	95	Moldova	127	Slovenia		
32	Cote d'Ivoire	64	Indonesia	96	Mongolia	128	South Africa		