



Empirical Analysis of The Effect of Foreign Direct Investment on Health Status In Sub-Saharan Africa: What Role For Governance?

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Abstract: This study aims to empirically investigate how governance affects the impact of foreign direct investment (FDI) on health outcomes in Sub-Saharan Africa, focusing on infant and child mortality rates. The study employs an econometric approach, using a dynamic panel model for 44 Sub-Saharan African countries over the period 2002 to 2019. The Generalized Method of Moments (GMM) is applied to address potential endogeneity issues and to produce robust empirical results. The results reveal that FDI significantly contributes to the reduction of infant and child mortality rates in the region. Additionally, the findings highlight that improved governance, particularly through effective control of corruption, enhances the positive impact of FDI on health outcomes. Good governance is shown to be a critical factor in maximizing the benefits of FDI for improving public health. The study concludes that FDI can be a powerful tool for improving health outcomes in Sub-Saharan Africa, particularly when supported by strong governance structures. The positive interaction between FDI and good governance underscores the importance of policy measures aimed at enhancing institutional quality in the region. The findings suggest that policymakers in Sub-Saharan Africa should focus on strengthening governance frameworks to attract more FDI and maximize its benefits for public health. Future research should explore the long-term effects of governance on the FDI-health relationship and examine sector-specific impacts to identify the most effective channels through which FDI can improve health outcomes.

Keywords: Health Status, Foreign Direct Investment, Governance, GMM Method, Sub-Saharan Africa, Togo

1. Introduction

The objective of both national and international development efforts is to improve population health. Despite recent successes in lowering mortality rates, particularly in Sub-Saharan Africa, the region still experiences high maternal and infant/child mortality rates compared to other parts of the world (WHO, 2018). For instance, in 2018, the newborn and child mortality rate was 78 deaths per 1,000 live births in Sub-Saharan Africa, compared to 4.03 and 38.8 deaths per 1,000 live births in the European Union and globally, respectively (WDI, 2019). According to WHO (2018), the region's health systems are fragile, characterized by insufficient financial and human resources, unavailability of health services, especially in rural areas, and inadequate health infrastructure.

Health spending is recognized as a crucial means for governments to invest in health (Boachie & Ramu, 2016), and the literature underscores the importance of health as a capital that requires investment to maintain (Grossman, 1972; Mushkin, 1962). Investment is generally considered a key driver of economic growth and development, but local investment alone may not suffice to ensure sustainable growth. Consequently, governments, particularly in developing countries, have developed strategies to attract Foreign Direct Investment (FDI) (Immurana, 2021). According to UNCTAD statistics (2018, 2019), FDI inflows to developing economies were \$646 billion and \$671 billion in 2016 and 2017, respectively, increasing by 2% in 2018. Africa saw a 10.05% rise in FDI, from \$41.8 billion in 2017 to \$46 billion in 2018. FDI is particularly crucial for Sub-Saharan African countries, given their growing need for foreign capital to achieve sustainable development goals. However, to attract such capital, these countries must improve governance indicators, as governance quality significantly influences FDI decisions (Outreville, 2007). Furthermore, good governance has been shown to enhance health outcomes, with better governance indicators linked to improved health results and more effective public health spending (Makuta & O'Hare, 2015; Farag et al., 2013).

While most empirical studies have focused on the effect of FDI on economic growth (Abbes et al., 2015; Abdouli & Hammami, 2017; Bermejo Carbonell & Werner, 2018; Iamsiraroj, 2016), fewer studies have examined the effect of FDI on health outcomes (Alam et al., 2016; Burns et al., 2017; Nagel et al., 2015). The debate around the impact of FDI on health remains unresolved. On the one hand, increased income due to FDI may improve health determinants, such as access to medical care, clean water,

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and sanitation infrastructure. Direct FDI in the healthcare sector could also increase the supply of medical goods and services, leading to lower prices and higher demand, thus improving health outcomes (Nagel et al., 2015; Outreville, 2007). On the other hand, FDI in sectors like mining or forestry could negatively affect health through environmental degradation (Immurana, 2021). Additionally, the repatriation of profits by foreign companies might hinder economic growth and worsen socioeconomic conditions (Agosin & Machado, 2005).

The importance of this study lies in the fact that much of the empirical literature on FDI has focused on its economic benefits, particularly in terms of growth and income (Herzer & Nunnenkamp, 2012). The welfare effects of FDI, especially concerning health, have been less explored (Immurana, 2021; Outreville, 2007). The choice of foreign investors is often influenced by the quality of the workforce and governance (Azemar & Desbordes, 2009). According to Herzer & Nunnenkamp (2012), FDI could improve health status if foreign investors offer higher wages and better social services than domestic firms. In addition, FDI-induced growth may have indirect health benefits, as higher average incomes lead to increased demand for healthcare (Bloom et al., 2018). Given the poor health outcomes in Sub-Saharan Africa, it is crucial to study the actual impact of FDI on population health in the context of strategies aimed at attracting FDI. The remainder of the study is organized as follows. First, we briefly overview the literature and discuss the methodology. Second, we present and discuss the estimation results, and the last section shows the conclusion followed by policy implications.

2. Literature Review

The literature on the role of Foreign Direct Investment (FDI) suggests that FDI is an important source of capital that complements domestic private investment and contributes to economic development and technology transfer (Outreville, 2007). The availability of private capital helps reduce the total burden on government resources. Numerous studies have shown that FDI promotes economic growth, wage increases, and overall improvements in working conditions in low- and middle-income countries (Blouin et al., 2009). In developing countries, where access to health care is highly dependent on the ability to pay, FDI may or may not be associated with improvements in population health.

Regarding the effect of FDI on health, Immurana (2021) demonstrates that FDI significantly improves health outcomes in African countries. Herzer & Nunnenkamp (2012) studied the effect of FDI on life expectancy at birth in a sample of 14 developed countries from 1970 to 2009 and found that FDI negatively affects life expectancy in these countries. Conversely, Nagel et al. (2015) examined the impact of FDI on population health, measured by infant mortality rate and life expectancy, in 179 countries over the period from 1980 to 2011. Using a fixed-effects model, they found that FDI positively influences health outcomes in low-income countries but negatively affects health in high-income countries.

Azemar & Desbordes (2009) conducted a study involving 70 developing countries over the period from 1985 to 2004 to analyze the relationship between governance, FDI, and health using a fixed-effects model. They concluded that an integrated health policy could increase FDI flows and contribute to economic growth in these developing countries. These results highlight the importance of governance, including institutional quality, in the relationship between FDI and health. Golkhandan (2017) studied the long-term relationship between FDI and health indicators in 25 developing countries from 1995 to 2014 and concluded that there is a positive relationship between FDI and health status when FDI is facilitated in host countries.

Alam et al. (2016), in a study on Pakistan covering the period from 1972 to 2013, found that FDI increased long-term life expectancy. Additionally, they found that FDI positively influences short-term life expectancy. Studies by Asiedu et al. (2015) and Ghosh & Renna (2015) reported similar findings. In a related study, Burns et al. (2017) examined the relationship between FDI and health status in 85 low- and middle-income countries from 1974 to 2012 using the instrumental variables approach. They found that FDI increases life expectancy and reduces adult mortality rates. However, there is also ambiguity regarding the potentially negative health effects of FDI (Herzer & Nunnenkamp, 2012). Furthermore, global financial integration and competition for FDI flows may limit governments' ability to provide public goods.

Figure 1 shows the conceptual framework of the relationship between FDI and population health, illustrating the channels through which FDI can directly or indirectly affect population health status or health outcomes.

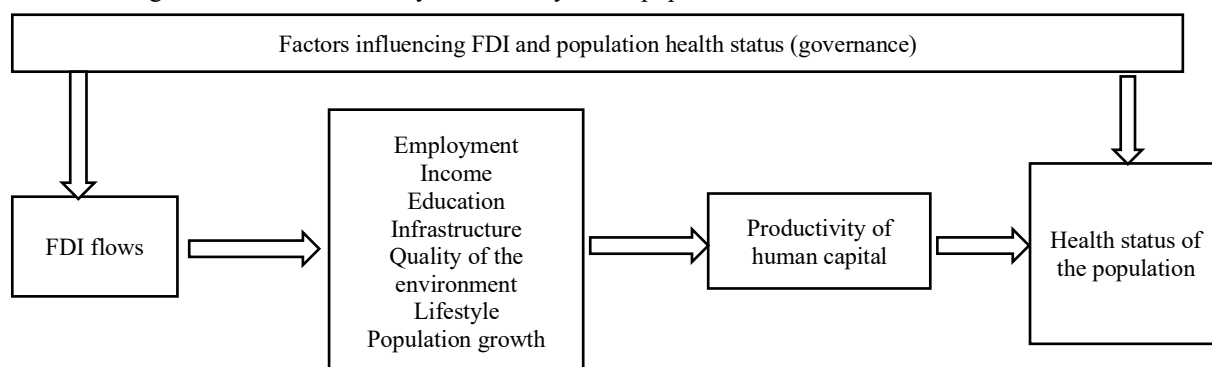


Figure 1: Conceptual framework of the relationship between FDI and population health. Source: Author, Adapted from (Immurana, 2021)

The literature shows that very few studies have been devoted to analyzing the effect of FDI on health outcomes (Siddique et al., 2021), and very few studies have analyzed this relationship in the context of Sub-Saharan African countries that attract FDI flows (Azemar & Desbordes, 2009; Immurana, 2021). It is therefore important to analyze the role of governance in the relationship between FDI and health status in Sub-Saharan Africa because, on the one hand, recent years have been marked by a renewed interest in the consequences of governance and poor governance on economic development and, on the other hand, governance is a key determinant of country choice for FDI.

3. Methodology

3.1. Data And Model

The dataset comes mainly from the World Bank database (WDI, 2019). A sample of 44 Sub-Saharan African countries (**Table 1**) was defined, for which we use annual observations covering the period from 2002 to 2019.

Table 1: List of countries

No	Country	No	Country	No	Country
1	Angola	15	Equatorial Guinea	29	Mauritania
2	Benin	16	Eswatini	30	Mauritus
3	Botswana	17	Ethiopia	31	Mozambique
4	Burkina Faso	18	Gabon	32	Namibia,
5	Burundi	19	Gambia	33	Niger
6	Cameroon	20	Ghana	34	Nigeria
7	Cape Verde	21	Guinea	35	Rwanda
8	Central Africa	22	Guinea Bissau	36	Sao Tomé et Principes
9	Comoros	23	Kenya	37	South Africa
10	Congo (Republic)	24	Lesotho	38	Senegal
11	Congo (Democratic)	25	Liberia	39	Sierra Leone
12	Côte d'Ivoire	26	Madagascar	40	Sudan
13	Chad	27	Mali	41	Tanzania
14	Djibouti	28	Malawi	42	Togo

Source: World Development Indicator (WDI, 2019)

Based on the conceptual framework defined above and the existing literature on the relationship between FDI and health status discussed above, the general empirical formulation is given as follows:

$$H = f(FDI, Gov, SEE) \quad (1)$$

Where H is the health status indicator, measured by the infant and child mortality rate (TMIJ); FDI represents foreign direct investment; Gov is the governance indicator; and SEE represents a vector of socioeconomic and environmental variables. To analyze the role of governance in the relationship between FDI and health, the equation for the interaction model of governance and FDI on health is given as follows:

$$TMIJ = F(FDI Gov * FDI, SEE) \quad (2)$$

Where Gov×FDI represents the interaction of governance and public health expenditure indicators. For a more detailed analysis of the effect of governance, we also used two disaggregated indicators of governance, namely control of corruption and political stability (Stab. Pol). On one hand, corruption is a global phenomenon affecting all countries (Vian, 2008); on the other hand, Sub-Saharan African countries have experienced socio-political instability in recent years. The methodological approach follows a panel data model for African countries covering the period from 2002 to 2019:

$$TMIJ_{it} = \alpha_i + \alpha_1 FDI_{it} + \alpha_2 Gov_{it} + \alpha_3 GDP_{it} + \alpha_4 DPS_{it} + \alpha_5 Edu_{it} + \alpha_6 CRPOP_{it} + \alpha_7 Urb_{it} + \epsilon_{it} \quad (3)$$

Where α_i represents the country-specific effect. i and t represent the number of individuals (countries) and the period (years), respectively. FDI inflows can generate economic growth and income, which would increase individuals' ability to purchase more health-related goods and services, resulting in improved health outcomes (Burns et al., 2017; Immurana, 2021). Gov represents the governance indicator. The literature has shown that population health is better in countries with higher governance scores than in those with lower scores (Biadgilign et al., 2019). Two indicators of governance, control of corruption (Corruption) and political stability (Stab. Pol), are also used. DPS represents public health expenditure, reflecting how governments invest in health by providing health infrastructure (Boachie & Ramu, 2016). GDP is gross domestic product per capita in US dollars (Frijters et al., 2005). EDU represents educational attainment, as measured by the gross elementary school enrollment rate. The effect of educational attainment on health is widely discussed in the literature (Desai, 2000; Peters et al., 2010). CRPOP indicates the population growth rate per year. Increases in population or urbanization levels may be accompanied by increases in health infrastructure and health personnel, contributing to improved health outcomes (Uprety, 2019). Urb refers to the urbanization rate.

3.2. Analysis Of The Descriptive Statistics Of The Variables

The descriptive statistics of the variables show heterogeneity within the sample. This disparity is evident in health, where the variation in the infant and child mortality rate (TMIJ) from one country to another is about 38 deaths per 1,000 live births. Statistics show that the variability of FDI as a percentage of GDP is 8% from one country to

another. Governance indicators are low, averaging -0.6 points on a scale of -2.5 to 2.5, indicating lower and higher governance scores, respectively. The other characteristics of the variables are presented in Table 2 below.

Table 2: Descriptive statistics of variables

Variable	Observations	Average	St. deviation	Minimum	Maximum
TMIJ	792	90.346	37.807	14.5	213.9
FDI	792	4.759	8.292	-11.199	103.337
Governance	792	-0.617	0.574	-1.719	0.880
Corruption	792	-0.625	0.598	-1.816	1.217
Stab. Pol	792	-0.508	0.864	-2.699	1.200
GDPH	792	2008.514	2856.061	111.927	22942.61
DPS	792	1.610	1.141	0.104	6.047
Educ	638	100.921	22.327	38.326	149.308
CrPop	792	2.506	0.871	-0.616	4.655
Urbanisation	792	40.837	17.508	8.682	89.741

Source: Calculated by Author based on WDI (2019) data.

3.3. Estimation Technique

To analyze the effect of FDI and governance on the population's health status in Sub-Saharan Africa (SSA), the econometric approach is based on a fixed-effects model for a panel of 44 SSA countries covering the period from 2002 to 2019. To control for endogeneity issues, we apply the generalized method of moments (GMM) approach (Arellano & Bond, 1991; Blundell & Bond, 1996). This approach allows for unobserved fixed effects, endogenous independent variables, and the presence of heteroskedasticity and autocorrelation across or within the panel. The general model (4) and the interaction model (5) are given in their dynamic forms as follows:

$$TMIJ_{it} = a_i + a_1TMIJ_{it-1} + a_2FDI_{it} + a_3Gov_{it} + a_4GDP_{it} + a_5DPS_{it} + a_6Edu_{it} + a_7CRPOP_{it} + \epsilon_{it} \quad (4)$$

$$TMIJ_{it} = a_i + a_1TMIJ_{it-1} + a_2FDI_{it} + a_3Gov_{it} * FDI_{it} + a_4GDP_{it} + a_5DPS_{it} + a_6Edu_{it} + a_7CRPOP_{it} + a_8Urb_{it} + \epsilon_{it} \quad (5)$$

$TMIJ_{it}$ Represents the lagged variable of the health indicator

4. Results And Data Analysis

4.1. Effect Of FDI and Governance On Health Status

Table 3 below shows the results of estimating the effect of FDI and governance indicators on health, as measured by the infant mortality rate and life expectancy at birth. The results indicate that the lagged infant mortality rate variable (L.TMIJ) coefficient is significant and positive, illustrating the dependent nature of mortality over time. The analysis reveals a significant effect of FDI on health. For instance, a 1% increase in FDI is associated with a decrease in TMIJ by 0.02%.

Regarding governance, the findings demonstrate that improved governance quality contributes to better health outcomes. Specifically, a 1% increase in governance quality would reduce infant and child mortality by approximately 2.78%. The disaggregated indicators of governance present a similar trend. Controlling corruption, for example, leads to a reduction in child mortality by about 2.95%. Additionally, enhanced political stability contributes to a decrease in child mortality by 0.64%.

The results concerning socio-economic and environmental variables show a significant effect of per capita income. An increase in per capita income contributes to a reduction in infant and child mortality by about 0.7%. Public health expenditure also shows a significant impact on health, reducing under-five mortality by 0.5%. Furthermore, increasing the education level by 1% would reduce infant and child mortality by approximately 0.07%.

The analysis also suggests that a 1% increase in the urbanization rate would decrease mortality by about 0.03%. Similarly, a 1% increase in the population growth rate contributes to a reduction in infant and child mortality by approximately 0.48%. This result may be explained by the fact that urbanization and population growth policies are often accompanied by health policies, such as improved access to healthcare, availability of health services, and job creation.

Table 3: Results of the estimates of the effect of FDI and governance on health status

Variables	GMM Estimator		
	Infant and child mortality rate		
L.TMIJ	0.844*** (0.00328)	0.839*** (0.00341)	0.844*** (0.00324)
FDI	-0.0197** (0.00771)	-0.0190** (0.00785)	-0.0202*** (0.00776)
LGDPH	-0.700*** (0.0682)	-0.954*** (0.0705)	-0.994*** (0.0710)
DPS	-0.514*** (0.0527)	-0.422*** (0.0552)	-0.813*** (0.0521)
Educ	-0.0673*** (0.00257)	-0.0717*** (0.00266)	-0.0727*** (0.00271)
CrPop	-0.481***	-0.703***	-0.197***

	(0.0621)	(0.0639)	(0.0631)
Urbanisation	-0.0348***	-0.0345***	-0.0335***
	(0.00358)	(0.00364)	(0.00365)
Governance	-2.779***		
	(0.114)		
corruption		-2.951***	
		(0.122)	
Stab Pol			-0.643***
			(0.0642)
Constant	24.21***	27.16***	27.85***
	(0.821)	(0.866)	(0.897)
AR(1)	Pr > z = 0.005	Pr > z = 0.005	Pr > z = 0.001
AR(2)	Pr > z = 0.961	Pr > z = 0.976	Pr > z = 0.699
Test de Sargan	Prob > chi2 = 0.174	Prob > chi2 = 0.184	Prob > chi2 = 0.135
Test de Hansen	Prob > chi2 = 0.411	Prob > chi2 = 0.362	Prob > chi2 = 0.425
Observations	598	598	598
Number of Id	44	44	44

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimate based on WDI (2019) data.

4.2. Effect of The Interaction of FDI And Governance on Health Status

Table 4 below illustrates the effect of the interaction between governance and FDI on health status. Overall, the results indicate that the quality of governance enhances the effect of FDI on the population's health status. This effect is more pronounced with the improvement of governance indicators. The analysis shows that the effective utilization of FDI contributes to a reduction in infant and child mortality by 0.27%. This finding is consistent with the disaggregated governance indicators. For instance, controlling corruption in the use of FDI leads to a reduction in child mortality by 0.27%. Similarly, political stability enables FDI to reduce infant and child mortality by 0.07%.

Table 4: Results of the estimates of the effect of the interaction of FDI and governance on health status

Variables	GMM Estimator		
	Infant and child mortality rate		
L.TMIJ	0.838***	0.836***	0.840***
	(0.00353)	(0.00361)	(0.00334)
FDI	-0.206***	-0.216***	-0.0498***
	(0.0156)	(0.0153)	(0.00862)
LGDPH	-1.107***	-1.261***	-1.106***
	(0.0747)	(0.0774)	(0.0721)
DPS	-0.785***	-0.745***	-0.887***
	(0.0546)	(0.0554)	(0.0521)
Educ	-0.0759***	-0.0778***	-0.0782***
	(0.00282)	(0.00285)	(0.00277)
CrPop	-0.316***	-0.394***	-0.173***
	(0.0668)	(0.0675)	(0.0642)
Urbanisation	-0.0388***	-0.0337***	-0.0387***
	(0.00383)	(0.00386)	(0.00371)
GouvIDE	-0.266***		
	(0.0188)		
CorrIDE		-0.273***	
		(0.0175)	
StapolIDE			-0.0738***
			(0.0113)
Constant	30.41***	31.87***	30.18***
	(0.947)	(0.981)	(0.916)
AR(1)	Pr > z = 0.000	Pr > z = 0.001	Pr > z = 0.001
AR(2)	Pr > z = 0.989	Pr > z = 0.869	Pr > z = 0.759
Test de Sargan	Prob > chi2 = 0.173	Prob > chi2 = 0.117	Prob > chi2 = 0.114
Test de Hansen	Prob > chi2 = 0.288	Prob > chi2 = 0.233	Prob > chi2 = 0.217
Observations	598	598	598
Number of Id	44	44	44

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: Author's estimate based on WDI (2019) data.

5. Discussion

The analysis of the data in Table 2 demonstrates that FDI has a substantial overall impact on health outcomes. This finding aligns with the results of previous research (Burns et al., 2017; Alam et al., 2016). This can be attributed to the fact that FDI boosts income, as increased employment opportunities lead to higher healthcare consumption. Additionally, FDI targeted specifically at the health sector can raise the standard of care, resulting in improved health outcomes. Furthermore, foreign companies may participate in health development initiatives, such as awareness campaigns or immunization programs, as part of their social responsibilities (Immurana, 2021).

The analysis highlights the importance of governance in enhancing the effect of FDI in significantly reducing infant and child mortality in sub-Saharan African countries. Therefore, African governments must design strategies centered around good governance policies to attract more FDI and improve health indicators. The quality of governance in improving health is crucial. For example, the effective allocation of health resources to targeted goals could significantly affect health outcomes (Farag et al., 2013). For disaggregated governance indicators such as control of corruption and political stability, the effect of the interaction between control of corruption and FDI is much larger, as corruption directly impacts the efficient use of resources. In contrast, political stability indirectly affects health through macroeconomic instability, population displacement, cleavages, and tensions within the population.

The results also showed the significance of public health spending. This finding is consistent with the literature (Arthur & Oaikhenan, 2017; Bein et al., 2017; Kato et al., 2018). Public health spending is considered a means for public policymakers to invest in health or boost health sector financing (Boachie & Ramu, 2016). Increased public spending on health would help reduce inequities in care and access to health services, improve the performance of health services and health systems, and enhance the quality of healthcare provision through an increase in the quantity and quality of the health workforce, as well as improvements in health infrastructure.

The analysis of the results also revealed a significant effect of per capita income on the health status of populations. This result is not surprising, as economic growth can be accompanied by numerous employment opportunities and higher incomes, increasing individuals' ability to afford healthcare and other health-enhancing goods and services (Immurana, 2021). This result confirms the important contribution of income to health, as highlighted in the literature (Filmer & Pritchett, 1999). On the one hand, an increase in income levels allows households to improve their lifestyle, diet, hygiene, and socioeconomic status. On the other hand, increasing the level of growth enables countries to allocate more resources to the health sector to improve the quality of care and reduce health inequalities.

The results also show a significant effect of education on health. This finding is consistent with the theoretical literature on the effect of education in producing health (Uprety, 2019). Education enables individuals to engage in healthy behaviors (e.g., hygiene practices) by becoming effective producers of health. The results are consistent with those found in empirical studies (Desai, 2000). Regarding the level of urbanization, high urbanization accompanied by the provision of sanitation infrastructure, safe water supply, and access to electricity would reduce the risk of morbidity (Bayati et al., 2013). Similarly, population growth or birth policies tend to increase health expenditures in general and public health expenditures in particular. Therefore, birth policies must be accompanied by investments in the health sector to improve the efficiency of health systems; otherwise, these policies could contribute to a deterioration in the health status of populations.

6. Conclusion

This study examined the role of governance in the relationship between FDI and health status, as measured by the infant and child mortality rate indicator, in sub-Saharan Africa. The study covered 44 countries in sub-Saharan Africa over the period from 2002 to 2019. The results revealed that FDI significantly reduces infant and child mortality rates in the sub-Saharan Africa region. The findings also indicated that governance quality is an attractive factor for FDI. Through this study, we realized that good governance enhances the effect of FDI on health outcomes. Moreover, since governance indicators are generally weak in sub-Saharan African countries, the findings imply that policymakers in these countries should intensify efforts to attract more FDI by pursuing strategies to improve the quality of governance in the region. This could help accelerate efforts to achieve MDG 3 for good health and well-being.

7. Limitations Of The Study And Future Recommendations

The main limitation of this study is the lack of long-term data for a more thorough analysis. As an extension of this study, future research could focus on analyzing the role of governance in the relationship between FDI and health in the long run, with an emphasis on the marginal effects induced by the interaction between governance and FDI on health. Additionally, it would be relevant to examine the effect of sectoral FDI on health outcomes to identify the main channels through which FDI can consistently affect population health. As a policy implication, policymakers should strive to reach agreements with foreign investors, ensuring the reinvestment of accumulated profits, strengthening corporate social responsibility, and providing sufficient skills and technological spillovers that can help improve health indicators.

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