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The Relationship Between the Budget Allocated to Health and the Density of Health Workers and Communicable Diseases in the Context of Sustainable Development Goals

Sürdürülebilir Kalkınma Hedefleri Bağlamında Sağlığa Ayırılan Bütçe ile Sağlık Çalışanlarının Yoğunluğu ve Bulaşıcı Hastalıklar Arasındaki İlişki

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Özet

Amaç: Birleşmiş Milletler, "Sürdürülebilir Kalkınma Amaçları (SDG)" başlığı altında 17 amaç belirleyerek AIDS, tüberküloz salgınlarının sona erdirilmesini ve hepatitle mücadeleyi hedeflemiştir. Sağlık bütçeleri ve sağlık çalışanı sayısı bu hastalıkların önlenmesinde ve tedavisinde önemli rol oynamaktadır. Sağlık hizmetlerine ayrılan bütçe (gösterge SDG 1.a) ile nüfus başına düşen sağlık çalışanı sayısı (gösterge SDG 3.c) ve HIV, tüberküloz ve hepatit B yaygınlığı (gösterge SDG 3.3) arasındaki ilişkiyi incelemeyi amaçladık.

Gereç ve Yöntemler: Tanımlayıcı korelasyonel bir çalışmadır. SDG gösterge verileri DSÖ'nün Dünya Sağlık İstatistikleri 2022 raporundan elde edilmiştir. 194 ülkeden veriler dahil edilmiştir. Sürdürülebilir Kalkınma Amacı göstergeleri arasındaki ilişkiler Spearman korelasyon analizi kullanılarak değerlendirilmiş ve $p<0,05$ istatistiksel anlamlılık değeri olarak kabul edilmiştir.

Bulgular: SDG 1.a ve SDG 3.c göstergeleri, 5 yaş altı yeni HIV enfeksiyonları ile orta düzeyde negatif korelasyona sahipken, Tüberküloz insidansı ve Hepatit B yüzey antijeni (HBsAg) prevalansı ile güçlü negatif korelasyona sahipti. En kötü göstergelere sahip ülkelerin çoğu Afrika bölgesindeydi.

Sonuç: Refah düzeyinin, sağlığa ayrılan bütçenin ve sağlık çalışanlarının sayısının yeterli seviyeye yükseltilmesi tüm hükümetlerin temel görevleri arasında yer almalıdır.

Anahtar Kelimeler: Bulaşıcı Hastalıklar, sağlık harcamaları, sağlık personeli, sürdürülebilir kalkınma.

Abstract

Objective: Objective: The United Nations has set 17 goals under the title of "Sustainable Development Goals (SDGs)", and aimed to end the epidemics of AIDS, tuberculosis, and combat hepatitis. Healthcare budgets and the number of health workers play an important role in preventing and treating these diseases. We aimed to examine the relationship between the budget allocated to health services (indicator SDG 1. a) the number of health workers per population (indicator SDG 3. c) and the prevalence of HIV, tuberculosis, and hepatitis B (indicator SDG 3.3).

Materials and Methods: This is a descriptive correlational study. SDG indicator data were obtained from WHO's World Health Statistics 2022 report. Data from 194 countries were included. The relationships between SDG indicators were evaluated using Spearman correlation analysis and $p<0.05$ was accepted as statistical significance value.

Results: SDG 1. a and SDG 3. c indicators had a moderate negative correlation with New HIV infections and a strong negative correlation with Tuberculosis incidence and Hepatitis B surface antigen (HBsAg) prevalence under 5 years. Most of the countries with the worst indicators were in the African region.

Conclusion: Raising the level of welfare, the budget allocated to health, and the number of health professionals to an adequate level should be among the main tasks of all governments.

Keywords: Communicable Diseases, Health Expenditure, Health Personnel, Sustainable Development.

INTRODUCTION

Today, many public and non-public organizations and institutions have been established to eliminate inequalities, ensure justice, and achieve the goal of a healthy society. The United Nations (UN) was founded with the principles of more justice, equality, and peace in a healthy world and has taken many steps to realize these goals so far (1). In 2000, with the signature of UN member states, 8 main goals were set for a healthier, more equal, and developed world under the title of "Millennium Development Goals (MDGs)" (2). By 2015, the MDGs - which include the goals of eradicating extreme poverty and hunger, global access to basic education, gender equality, improving maternal and child health and reducing mortality, reducing infectious diseases, and ensuring a sustainable environment - had been achieved to some extent, but not fully. Many steps have been taken globally and nationally towards these goals, and the achievements are remarkable, but still insufficient (3). Based on the MDGs, the UN has set 17 new goals under the "Sustainable Development Goals (SDGs)", which aim to be achieved between 2015 and 2030. These goals address human beings in their physical, biological, social, and psychological integrity and strive to bring humanity to a healthy, developed, and sustainable world without leaving a single person behind (4).

The 17 Sustainable Development Goals adopted by world leaders in September 2015 set a vision for a world free of poverty, hunger, disease, and want. SDG 3, "Good Health and Well-Being," calls on countries to ensure healthy lives and promote well-being for all at all ages (5). SDG Target 3.3 aims to end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and combat hepatitis, water-borne diseases, and other communicable diseases, by 2030. SDG Target 3. c aims to substantially increase health financing and the recruitment, development, training, and retention of the health workforce in developing countries, especially in least-developed countries and small island developing states. SDG Target 1 aims to eradicate extreme poverty by 2030. SDG Target 1. aims to ensure significant mobilization of resources from a variety of sources, including through enhanced development co-operation, to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programs and policies to end poverty in all its dimensions (6).

Healthcare budgets and the number of health workers play an important role in preventing and treating these diseases. Inadequate health budgets and insufficient numbers of health workers can create challenges in preventing the spread of these diseases (7). This research aims to examine the relationship between the budget allocated to health services (indicator SDG 1. a) the number of health workers per population (indicator SDG 3. c) and the prevalence of HIV, tuberculosis, and hepatitis B (indicator SDG 3.3). This will provide a better view of what steps need to be taken to reduce the incidence of these diseases.

MATERIALS AND METHODS

Subject

This study is designed as an ecological study. The independent variables of our study are Domestic general government health expenditure as a percentage of general government expenditure (SDG 1. a) and density of medical doctors, nursing and midwifery staff, and pharmacists (SDG 3. c). Dependent variables are HIV incidence, Tuberculosis incidence, and Hepatitis B prevalence (SDG 3.3). These data were obtained from WHO's World Health Statistics 2022 report (8). In this report, SDG 3.3 and 3. c indicators are for 2020, and SDG 1. a indicator is for 2019. Data from 194 countries are included.

Statistical Analysis

Data analysis is performed with IBM SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, N.Y., USA). Since the variables were not normally distributed, the relationships between them were evaluated using Spearman correlation analysis, and $p<0.05$ was accepted as a statistical significance value. The correlation coefficient (r) is weak if r=0.00-0.24, moderate if r=0.25-0.49, strong if r=0.50-0.74, and very strong if r=0.75-1.00. Since the study was publicly available research utilizing secondary data, no ethics committee was applied. No financial support was received for the study.

RESULTS

When compared across regions, the lowest domestic general government health expenditure was in the African Region and the highest in the Americas. The highest density of doctors, nurses, and midwives was in Europe, while the highest density of pharmacists was in SSoutheastAsia, followed by Europe (Table 1).

As shown in Figure 1, the highest HIV incidence was in Africa (0.82 per thousand), 4.5 times higher than in Europe (0.18 per thousand).

Tuberculosis incidence was highest in Africa and South-East Asia (Figure 2). Hepatitis B prevalence was also very high in Africa (Figure 3).

Table 1. SDG 1.a and DSG 3.c indicators by region				
	Domestic general government health expenditure (%)	**Density of medical doctors**[*]	**Density of nursing and midwifery personnel**[*]	**Density of pharmacists**[*]
African Region	6.9	2.9	12.9	0.8
Eastern Mediterranean Region	8.6	11.2	16.5	3.3
South-East Asia Region	8.0	7.7	20.4	6.6
Region of the Americas	14.0	24.5	81.6	5.1
Western Pacific Region	10.1	21.0	39.9	4.4
European Region	12.6	36.6	83.4	6.5
Global	10.5	16.4	39.5	4.7

*per 10,000 population
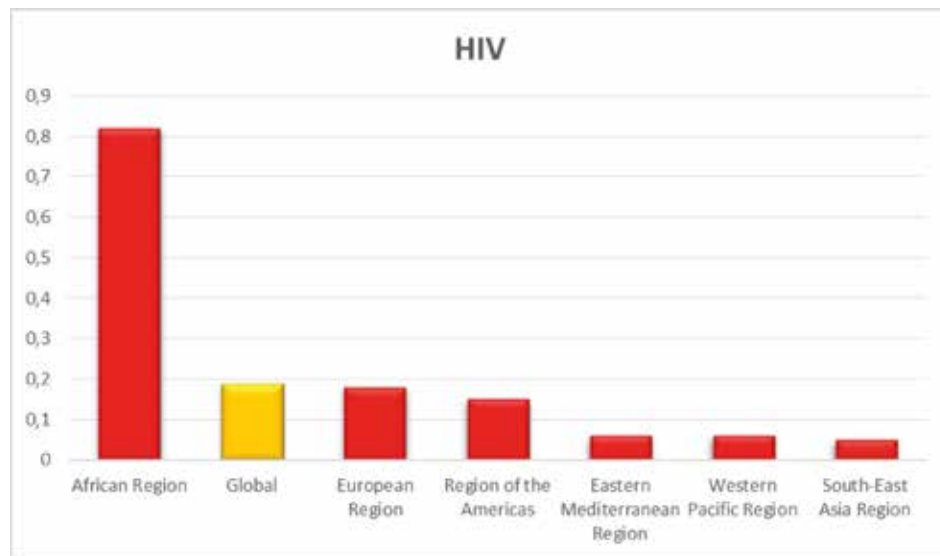
Figure 1. New HIV infections (per 1000 uninfected population) by region, 2020
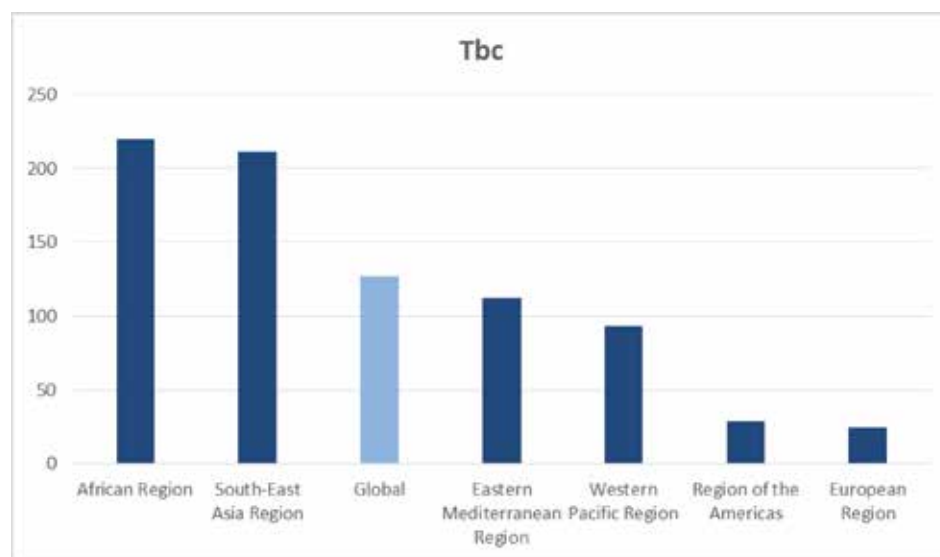
Figure 2. Tuberculosis incidence (per 100,000 population) by region, 2020
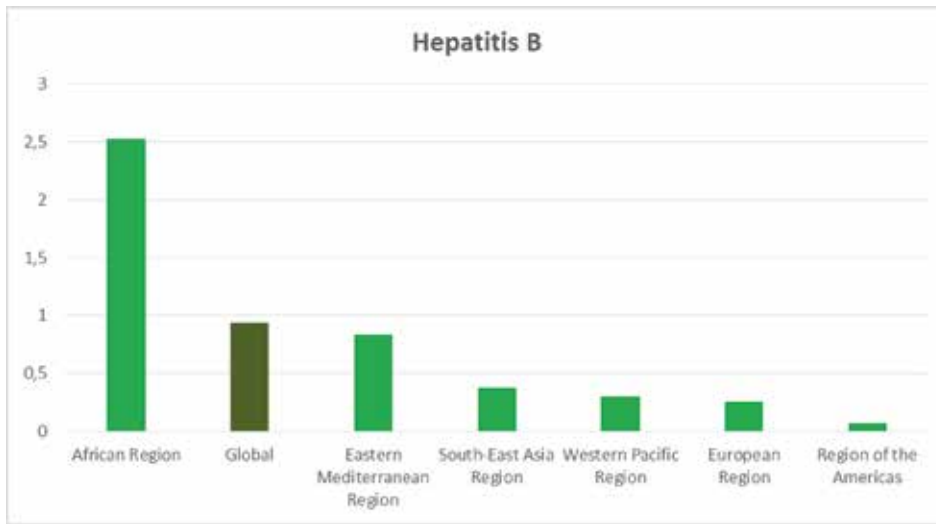
Figure 3. Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years (%) by region, 2020

Domestic general government health expenditure as percentage of general government expenditure, density of medical doctors, density of nursing and midwifery personnel and density of pharmacists had a moderate negative correlation with New HIV infections (per 1000 uninfected population) and a strong negative correlation with Tuberculosis incidence (per 100,000 population) and Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years (Table 2).

When the top 10 countries with the worst indicators among all countries are ranked, domestic general government health expenditure includes 7 countries, New HIV infections includes 10 countries, Tuberculosis incidence includes 5 countries and Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years includes 10 countries from Africa (Table 3).

This negative correlation is evident in Figures 4, 5 and 6, which show the relationship between domestic general government health expenditure as percentage of general government expenditure and infectious diseases.

Table 2. Correlation of SDG 1.a and 3.c indicators with SDG 3.3 indicators		New HIV infections (per 1000 uninfected population)	Tuberculosis incidence (per 100,000 population)	Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years (%)
Domestic general government health expenditure (GGHE-D) as percentage of general government expenditure (GGE) (%)	r	-0.247	-0.560	-0.518
	p	0.006	<0.001	<0.001
	n	125	188	188
Density of medical doctors (per 10,000 population)	r	-0.458	-0.686	-0.655
	p	<0.001	<0.001	<0.001
	n	130	193	193
Density of nursing and midwifery personnel (per 10,000 population)	r	-0.363	-0.616	-0.540
	p	<0.001	<0.001	<0.001
	n	130	194	194
Density of pharmacists (per 10,000 population)	r	-0.499	-0.625	-0.508
	p	<0.001	<0.001	<0.001
	n	114	167	167

Table 3. Ten worst countries according to SDG 1.a and SDG 3.c indicators			
Domestic general government health expenditure (%)	**New HIV infections (per 1000 uninfected population)**	**Tuberculosis incidence (per 100,000 population)**	**Hepatitis B surface antigen (HBsAg) prevalence among children under 5 years (%)**
Cameroon	Eswatini	Lesotho	South Sudan
South Sudan	Lesotho	South Africa	Chad
Eritrea	South Africa	Central African Republic	Somalia
Guinea-Bissau	Botswana	Philippines	Equatorial Guinea
Bangladesh	Zambia	Gabon	Guinea
Uganda	Mozambique	Democratic People's Republic of Korea	Liberia
India	Namibia	Timor-Leste	Mali
Congo	Congo	Marshall Islands	Angola
Myanmar	Zimbabwe	Namibia	Central African Republic
Benin	South Sudan	Papua New Guinea	Côte d'Ivoire
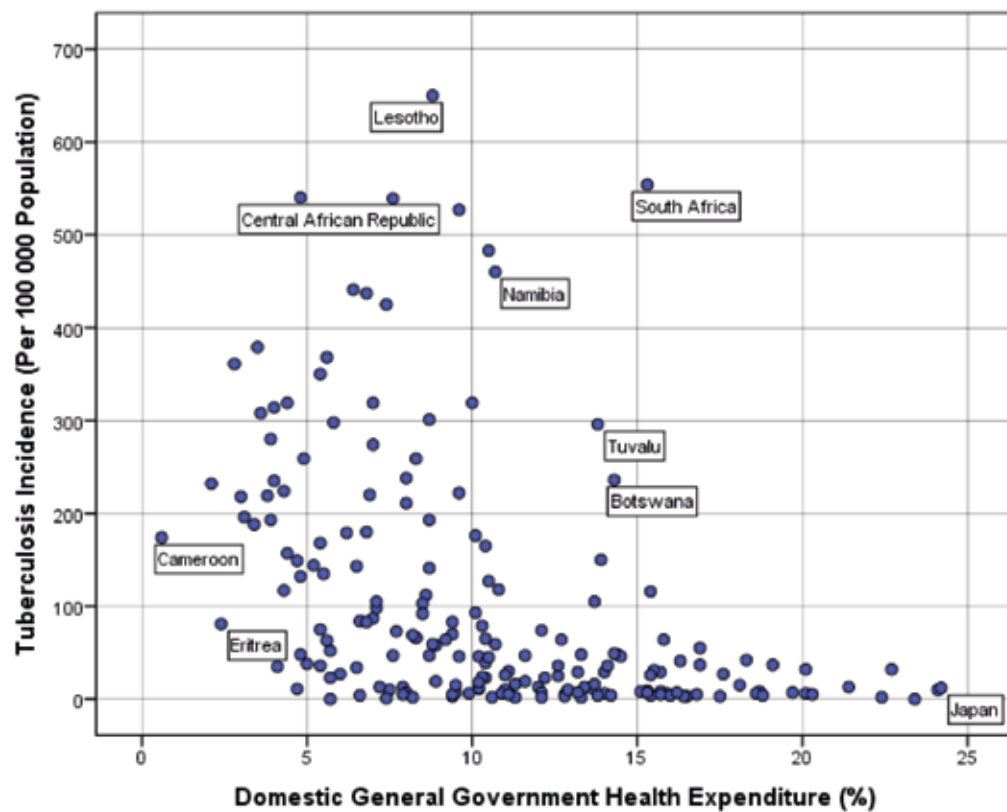
Figure 4. Comparison of SDG 1.a Indicator and SDG 3.3 Tuberculosis Indicator by Country
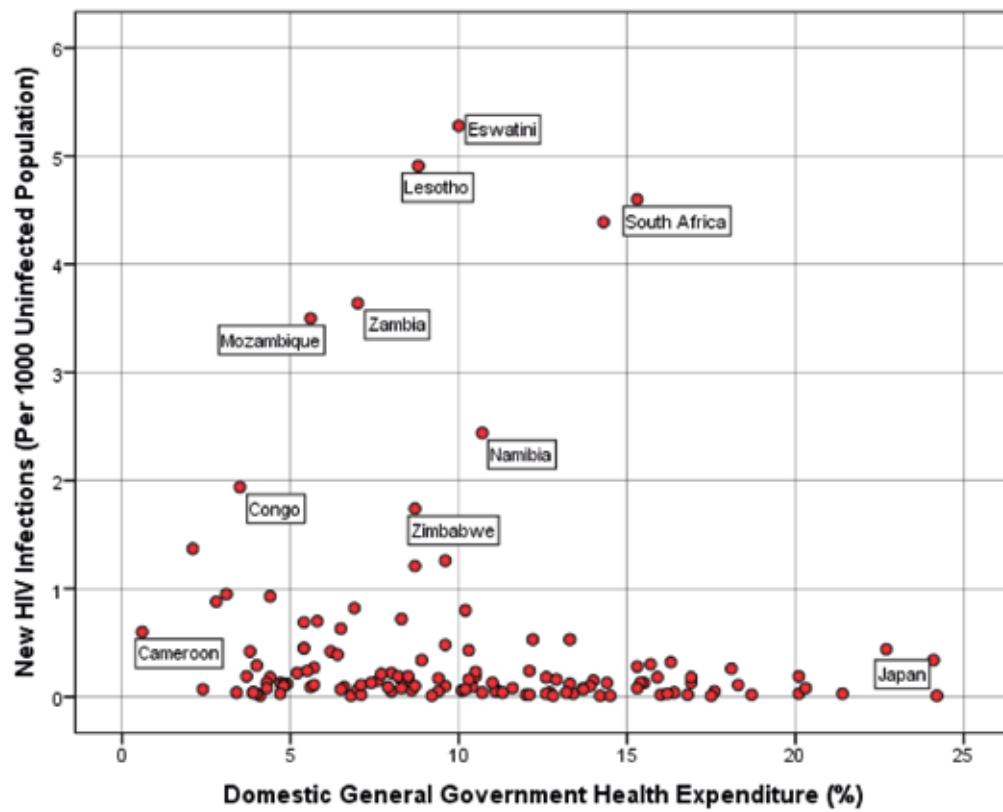
Figure 5. Comparison of SDG 1.a Indicator and SDG 3.3 HIV Indicator by Country
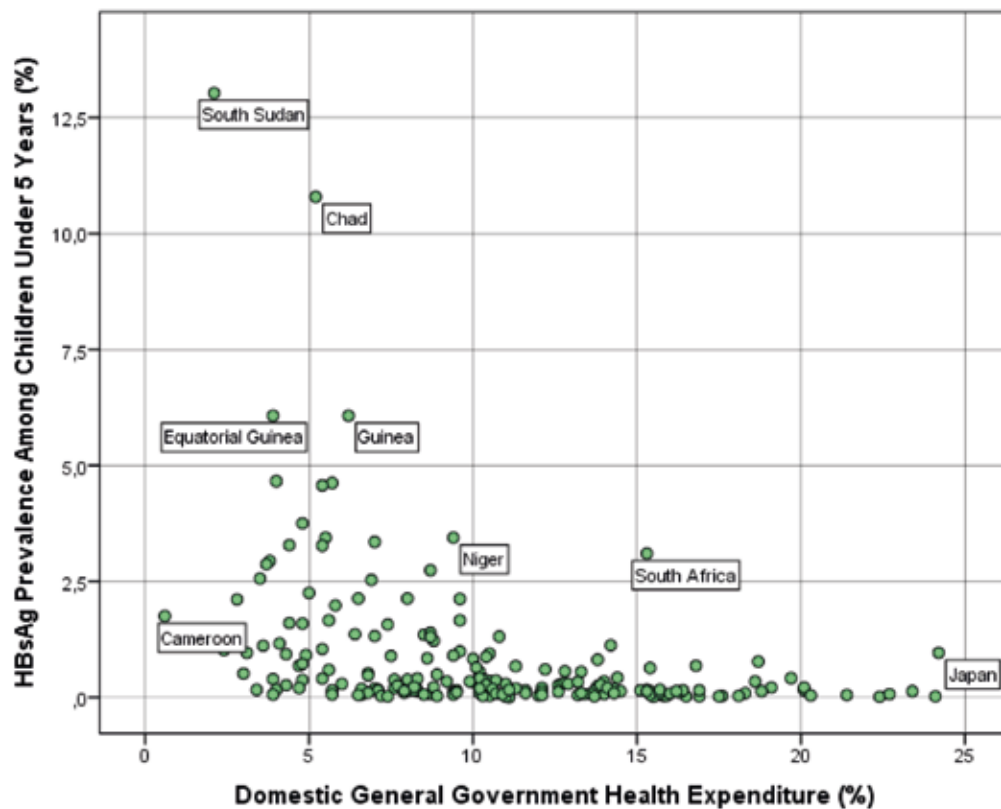

Figure 6. Comparison of SDG 1.a Indicator and SDG 3.3 Hepatitis B Indicator by Country

DISCUSSION

In this study, the relationship between the SDG indicators, namely the share allocated to health and the number of health workers per population, and the prevalence of HIV, tuberculosis, and hepatitis B was analyzed. According to WHO data, tuberculosis, HIV, and hepatitis B infections are recognized as major health problems worldwide. Every year, approximately 1.6 million people worldwide die from tuberculosis (8), 650,000 from HIV/AIDS (9) 820,000 from hepatitis B (10). A study covering EU/EEA countries examined infectious disease DALYs per 100,000 inhabitants and found that tuberculosis ranked second, HIV/AIDS third, and HBV infections seventh (11).

In our study, Africa had the lowest domestic general government health expenditure as a percentage, and density of doctors, nurses, midwives, and pharmacists. It was also the region with the highest incidence of HIV, tuberculosis, and hepatitis B. On a country basis, most of the 10 countries with the worst indicators in the world are African countries. A study in East Africa showed that increased health expenditure is positively correlated to life expectancy and negatively correlated to neonatal, infant, and under-5 mortality (12). The negative correlation we found between domestic general government health expenditure as a percentage of general government expenditure and HIV, tuberculosis, and Hepatitis B cases is consistent with the literature. In a study analyzing the relationship between public health expenditures and HIV mortality for 74 countries using annual data between 1981 and 2009, their results showed that an increase in public health expenditures is negatively correlated with HIV mortality (13). A study using data from 1997-2006 and investigating the factors affecting the incidence of tuberculosis in 134 countries found that the incidence of tuberculosis was negatively correlated to the share allocated to health and positively correlated to HIV prevalence (14). Since HIV infection is a factor that increases the severity of tuberculosis, the coexistence of the two diseases aggravates the prognosis.

The negative correlation we found between the density of medical doctors, the density of nursing and midwifery personnel, and the density of pharmacists and HIV, tuberculosis, and Hepatitis B cases is consistent with the literature. In a study using WHO data and including 157 countries, a one-unit increase in the number of health workers per 1000 inhabitants results in a 10-15% decrease in DALYs of infectious diseases. For a one-unit increase in the number of doctors, this rate was calculated as 30-45% (15). HIV/AIDS cases and deaths were lower in states with more social services and public health spending on the poor (16). In a study covering the years 2009-2015 in China, tuberculosis incidence and the number of health workers were found to be negatively correlated (17).

In conclusion, our study proved that there is a negative correlation between the budget allocated to health services (indicator SDG 1. a) and the number of health workers per population (indicator SDG 3. c) and the prevalence of HIV, tuberculosis and hepatitis B (indicator SDG 3.3). The budget allocated to health and the number of physicians, nurses, midwives, and pharmacists need to be increased, especially in African countries, which are in the worst situation. Eliminating barriers such as vaccination, health screening, increasing the prevalence of primary health care services, access to clean water, access to medicines, and access to physicians and health professionals are important for the achievement of the United Nations Sustainable Development Goals. Not all countries have equal levels of wealth. In such budget-constrained situations, it may be more optimal to prioritize groups at risk rather than all groups (18).

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