Data Article

Diarrhea deaths in children among countries with different levels of the human development index

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A R T I C L E   I N F O

A B S T R A C T

The present study investigated the effect of human development index (HDI) on diarrheal deaths per 1000 live births in children under 5 years old in 2015. In addition, the association between HDI, and the use of improved drinking-water sources and sanitation facilities were evaluated in this year. 75 countries that their information was available in Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) conducted by the World Health Organization (WHO) were included in this study. The data required was obtained from WHO and United Nations Development Programme (UNDP) websites. Pearson's correlation coefficient and linear regression were used to evaluate the correlation and association between the variables, respectively. The results showed that there is a significant relationship between HDI and diarrhea-associated deaths per 1000 live births in children during 2015 ($B = -354.85$, CI95%: -408.91, -300.79). In addition, HDI was associated with the use of improved drinking-water sources ($B = 83.93$, CI95%: 64.71, 103.15) and improved sanitation facilities ($B = 199.90$, CI95%: 174.39, 225.42) in 2015. These findings indicate the association between HDI and the measures relevant to diarrheal disease among children. Therefore, in order to achieve to the

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Millennium Development Goals regarding child health, policy-makers should concentrate on environmental and social factors affecting health.

Specifications table

Subject area	environmental science
More specific subject area	Nursing and health Professions
Type of data	Table and figure
How data was acquired	Secondary data
Data format	Raw and analyzed
Experimental factors	In order to determine the association between the variables, linear regression and Pearson's correlation analyses were performed by STATA 14.
Experimental features	Investigation relationship between human development index (HDI) whit diarrhea deaths per 1000 live births in children under 5 years and Use of improved drinking-water sources و Use of improved sanitation facilities
Data source location	Data Obtained from: WHO, UNDP
Data accessibility	Data are available from: World Health Organization. UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) 2017 report 2017 [cited 2017 November 8, 2017]. Available from: http://www.who.int/water_sanitation_health/publications/glaas-report-2017/en/. World Health Organization. Distribution of causes of death among children aged < 5 years, Diarrhoeal diseases 2016 [cited 2017 October 23, 2017]. Available from: http://apps.who.int/gho/data/view.main.ghe2002015-CH3?lang=en United Nations Development Programme. Human Development Data (1990–2015) 2015 [cited 2017 December 13, 2017]. Available from: http://hdr.undp.org/en/data.

Value of the data

- It is necessary to understand the factors affecting death in children under five years old.
- The results showed that efforts should be concentrated on environmental and social factors in order to achieve Millennium Development Goals for child health.
- This study provides an analysis to the status of countries in relation to child mortality and access to improved drinking-water sources and sanitation facilities based on the country's human development index.

1. Data

The data required for the analyses included diarrhea-associated deaths per 1000 live births in children, the use of improved drinking-water sources and improved sanitation facilities (at national, urban and rural levels) in percentage term in 2015 and HDI in 2015 (Table 1).

Table 1

Diarrhea-associated diarrhea deaths per 1000 live births in children under 5 years, the use of improved drinking-water sources and improved sanitation facilities (at national, urban and rural levels) in percentage term, and HDI in 2015.

Country	Sanitation rural	Sanitation urban	Sanitation national	Water rural	Water urban	Water nation	Diarrhea Deaths	HDI
Afghanistan	27	45	32	47	78	55	11.5	.479
Albania	90	95	93	95	95	95	0.2	.764
Argentina	98	96	96	100	99	99	0.2	.827
Azerbaijan	87	92	89	78	95	87	1.8	.759
Bangladesh	62	58	61	87	87	87	2.3	.579
Barbados	96	96	96	100	100	100		.795
Belarus	95	94	94	99	100	100		.796
Bhutan	33	78	50	100	100	100	2.1	.607
Bolivia	28	61	50	76	97	90	2.4	.674
Bosnia and Herzegovina	92	99	95	100	100	100		.75
Botswana	43	79	63	92	99	96	2.7	.698
Brazil	52	88	83	87	100	98	0.4	.754
Burkina Faso	7	50	20	76	97	82	7.2	.402
Burundi	49	44	48	74	91	76	8	.404
Cambodia	30	88	42	69	100	76	1.9	.563
Chile	91	100	99	93	100	99		.847
China	64	87	76	93	98	95	0.3	.738
Colombia	68	85	81	74	97	91	0.3	.727
Costa Rica	92	95	95	92	100	98	0.1	.776
Côte d'Ivoire	10	33	22	69	93	82	6.9	.474
Cuba	89	94	93	90	96	95	0.1	.775
Dominican Republic	76	86	84	82	85	85	1.5	.726
Ecuador	81	87	85	76	93	87	0.9	.739
El Salvador	60	82	75	87	97	94	0.9	.68
Ethiopia	28	27	28	49	93	57	4.9	.448
Fiji	88	93	91	91	100	96	0.9	.736
Georgia	76	95	86	100	100	100	0.1	.769
Ghana	9	20	15	84	93	89	4.1	.579
Guatemala	49	78	64	87	98	93	2.1	.64
Guinea	12	34	20	67	93	77	7.7	.424
Haiti	19	34	28	48	65	58	7.2	.493
Honduras	78	87	83	84	97	91	1.6	.625
India	28	63	40	93	97	94	4.7	.624
Jamaica	84	80	82	89	97	94	0.3	.73
Kenya	30	31	30	57	82	63	3.6	.555
Kyrgyzstan	96	89	93	86	97	90	1.1	.664
Lao	56	94	71	69	86	76	7.6	.586
Lesotho	28	37	30	77	95	82	8.6	.497
Liberia	6	28	17	63	89	76	6.2	.427
Lithuania	83	97	92	90	100	97		.848
Madagascar	9	18	12	35	82	52	4.5	.512
Malaysia	96	96	96	93	100	98	0.1	.789
Maldives	98	97	98	98	100	99	0.2	.701
Mali	16	38	25	64	97	77	10.8	.442
Mexico	74	88	85	92	97	96	0.4	.762
Micronesia	49	85	57	87	95	89	2.2	.638
Mongolia	43	66	60	59	66	64	1.4	.735
Mozambique	10	42	21	37	81	51	6.9	.418
Nepal	43	56	46	92	91	92	2.1	.558
Nigeria	25	33	29	57	81	69	11	.527
Pakistan	51	83	64	90	94	91	7.3	.55
Panama	58	84	75	89	98	95	0.9	.788
Papua New Guinea	13	56	19	33	88	40	3.9	.516
Paraguay	78	95	89	95	100	98	1.2	.693
Peru	53	82	76	69	91	87	0.8	.74

Table 1 (*continued*)

Country	Sanitation rural	Sanitation urban	Sanitation national	Water rural	Water urban	Water nation	Diarrhea Deaths	HDI
Philippines	71	78	74	90	94	92	2.2	.682
Rwanda	63	59	62	72	87	76	3.1	.498
Senegal	34	65	48	67	93	79	4.1	.494
Serbia	94	98	96	99	99	99		.776
Solomon Islands	15	81	30	77	93	81	2	.515
South Africa	61	70	66	81	100	93	3.6	.666
Swaziland	56	63	57	69	94	74	6.3	.541
Tajikistan	95	94	95	67	93	74	3.4	.627
Thailand	96	90	93	98	98	98	0.4	.74
Timor-Leste	27	69	41	61	95	72	4.8	.606
Tonga	89	98	91	100	100	100	0.6	.721
Ukraine	93	97	96	98	96	96	0.2	.743
Tanzania	8	31	16	46	77	56	3.9	.531
Uruguay	93	97	96	94	100	100	0.1	.795
Uzbekistan	100	100	100		98		2.3	.701
Vanuatu	55	65	58	93	99	94	3.9	.597
Venezuela	70	97	94	78	95	93	0.8	.767
Viet Nam	70	94	78	97	99	98	1.4	.683
Zambia	36	56	44	51	86	65	5.6	.579
Zimbabwe	31	49	37	67	97	77	6.7	.516

1.1. Correlation between HDI and diarrhea deaths in children under 5 years

The results showed that HDI in 2015 had a significant negative correlation with diarrhea-associated deaths per 1000 live births ($r = -0.83$, $p = < 0.001$). As it can be seen in Fig. 1, diarrhea-associated deaths are reduced by increasing HDI.

1.2. Correlation between HDI and use of improved drinking-water sources

According to Fig. 2, a significant positive correlation was observed between HDI in 2015 and the use of improved drinking-water sources at the national level ($r = 0.71$, $p = < 0.001$). In addition, HDI had positive correlations with the use of improved drinking-water sources in urban areas ($=0.46$, $p = < 0.001$), as well as rural level ($r = 0.68$, $p = < 0.001$).
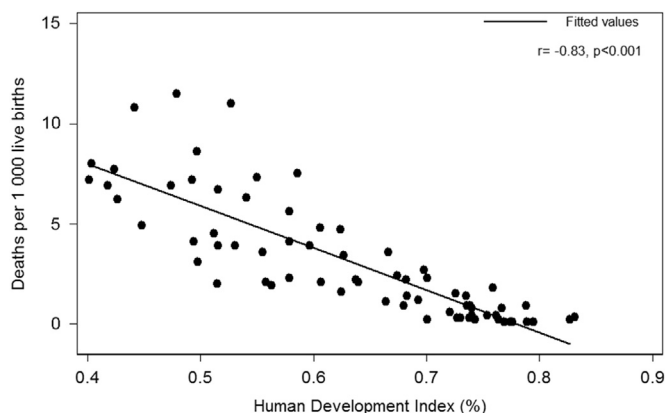

Fig. 1. Correlation between HDI and diarrhea deaths per 1000 live births in children under 5 years in 2015.
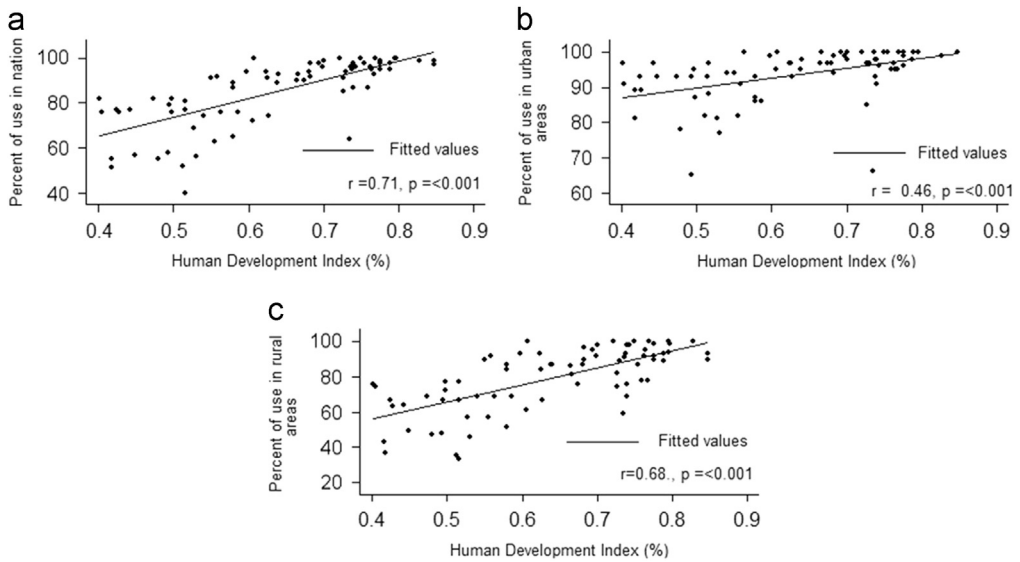
Fig. 2. Correlation between HDI and Use of improved drinking-water sources in 2015 in 3 levels: a: Correlation in national levels, b: Correlation in urban areas and c: Correlation in rural areas.
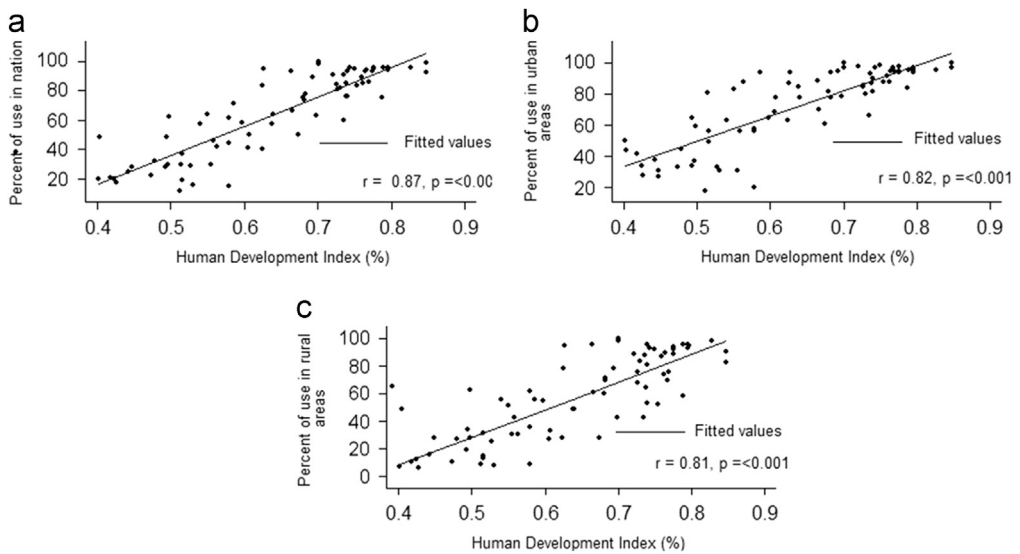

Fig. 3. Correlation between HDI and use of improved sanitation facilities in 2015 in 3 levels: a: Correlation in national levels, b: Correlation in urban areas and c: Correlation in rural areas.

1.3. Correlation between HDI and use of improved sanitation facilities

The correlation between HDI in 2015 and improved sanitation facilities at the national ($r = 0.87$, $p = < 0.001$), urban ($r = 0.82$, $p = < 0.001$), and rural ($r = 0.81$, $p = < 0.001$) levels were statistically significant (Fig. 3).

Table 2
Effect of HDI on diarrhea deaths, use of improved drinking-water sources and Use of improved sanitation facilities.

Independent variable	Dependent variable	B	*P*-value	95% Confidence Interval
HDI	**Water**			
	nation	83.93	< 0.001	(64.71, 103.15)
	urban	28.26	< 0.001	(15.77 ,40.76)
	rural	96.61	< 0.001	(72.32, 120.91)
HDI	**facilities**			
	national	199.90	< 0.001	(174.39, 225.42)
	urban	162.88	< 0.001	(137.26, 188.51)
	rural	200.25	< 0.001	(167.32,233.18)
HDI	**Diarrhea deaths**	−21.12	< 0.001	(−24.53, −17.70)

1.4. Linear regression analysis

Linear regression analysis was used to determine the relationship between the variables. According to Table 2, HDI had a significant relationship with diarrhea-associated deaths, and the use of improved drinking-water sources and improved sanitation facilities at national, urban and rural levels. On average with a one-unit increase in HDI, diarrhea-associated deaths decrease, while the use of improved drinking-water sources and improved sanitation facilities increases. The effect of HDI on the use of improved sanitation is greater than the use of improved drinking-water sources. In fact, people's access to improved sanitation is more dependent on the HDI and development status.

2. Experimental design, materials and methods

2.1. Study countries description

Diarrheal diseases are one of the major causes of death in children [1–4]. 75 countries that their information was available in the Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) were included in this study. The data about diarrhea-associated deaths per 1000 live births in children under 5 years, use of improved drinking-water sources (at the national, urban and rural level), and use of improved sanitation facilities (at the national, urban and rural level) were acquired from WHO website [5,6]. In addition, HDI values were obtained from UNDP website [7]. Human development index is combined of three parts, including life expectancy at birth, mean years of schooling, and gross national income per capita and its value is between 0 and 1 [8–11].

2.2. Analytical procedures

Pearson's correlation coefficient was used to calculate the correlation between the variables. Linear regression was used to analyze the relationship between the variables. All the statistical analysis were performed using STATA 14.

Transparency document. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2018.02.019.

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