

Impact of COVID-19 measures on the health and healthcare of children in East-Africa: Scoping review

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Abstract

Background: The COVID-19 pandemic is of grave concern. As scientific data is being collected about the nature of COVID-19, government leaders and policy makers are challenged. They might feel pressured to take strong measures to stop virus spread. However, decisions could cause more harm than do good. This study maps all existing literature regarding the impact of COVID-19 containment measures on the health and healthcare of children in East-Africa.

Methods: This scoping review follows Population Concept Context guidelines of Arksey and O'Malley and PRISMA 2020 checklist. PubMed, Web of Science, and Embase were searched. All peer-reviewed literature published in English between January 2020 and October 2022 was considered. Initial screening of titles and abstracts was undertaken independently by two reviewers, with a third available in case of doubt. This was followed by full-text screening involving two independent reviewers.

Results: In total, 70 studies were included. Eight containment measures affecting children's health and healthcare were distinguished: lockdowns, school closures, physical distancing, travel restrictions, business closures,

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stay-at-home orders, curfews, quarantine measures with contact tracing. The consensus in the studies is that containment measures could minimise COVID-19 spread but have adverse indirect effects on children in East-Africa. Seven indirect effects were distinguished: economic damage, limited education access, food insecurity, child abuse, limited healthcare access, disrupted health-programs, and mental health challenges.

Conclusion: Government leaders and policy makers should take adverse indirect effects of COVID-19 measures into account, particularly in resource-limited regions such as East-Africa, apply a holistic approach, and strengthen socioeconomic and health-systems to protect the most vulnerable.

KEYWORDS

children, COVID-19 measures, East-Africa, health, healthcare, indirect effects

Highlights

- COVID-19 containment measures have an adverse impact on the health and healthcare of children in East-Africa.
- Not all COVID-19 containment measures are universally applicable.
- Government leaders and policymakers should consider the indirect effects of COVID-19 containment measures and apply a holistic approach.
- Socioeconomic and health-systems should be strengthened in East-Africa.

1 | BACKGROUND

The COVID-19 pandemic is of grave concern. As scientific data is being collected about the nature of coronavirus disease, policy makers are challenged. They might feel pressured to take strong measures to stop the spread of the virus. Although this is understandable, it is important to be aware of the fact that decisions could cause more harm than do good.¹

The current overall Infection Fatality Rate of COVID-19 is 0.15%, and for children even less than 0.05%.^{2,3} This implies that the infection seldom harms children. However, the indirect effects of government-imposed containment measures, such as lockdowns and mobility restrictions might have an important adverse impact on children and their access to healthcare worldwide.⁴

Socioeconomic and health-systems in high-income countries (HIC) are better equipped against a pandemic than in low- and middle-income countries (LMIC) such as in East-Africa.⁵ Prior to the COVID-19 pandemic, children in East-Africa already faced higher levels of poverty, food insecurity, and reduced access to education, healthcare, and health-programs such as immunisation services than their peers in HIC. It is therefore likely that the indirect

effects of COVID-19 containment measures will impact children in this region more, exacerbating already existing health-inequalities.⁶

The aim of the study is to map all existing literature regarding the impact of COVID-19 containment measures on the health and healthcare of children in East-Africa.

2 | METHODS

This scoping review follows the Population Concept Context guidelines of Arksey and O'Malley and the PRISMA 2020 checklist.^{7,8} A systematic search was conducted in PubMed, Web of Science, and Embase on title and abstract. Duplicates removal and screening was done using Rayyan Software. Combinations of these keywords and synonyms were used: (1) Population: "children," AND (2) Concept: "COVID-19" AND (3) Context: "East-Africa". The search strategy can be found in Table 1. All peer-reviewed literature published in English between 1 January 2020 and 19 October 2022 was considered. Studies focussing on the association between COVID-19 containment measures and the health and healthcare of children in East-Africa that were based on qualitative and quantitative methods (guidelines, reviews, clinical studies, epidemiological studies) were included. The following 22 countries and territories are considered East-African based on the Statistics Division of the United Nations: British Indian Ocean Territory, Burundi, Comoros, Djibouti, Eritrea, Ethiopia, French Southern Territories, Kenya, Madagascar, Malawi, Mauritius, Mayotte, Mozambique, Réunion, Rwanda, Seychelles, Somalia, South-Sudan, Uganda, Tanzania, Zambia, Zimbabwe.⁹ Studies were excluded when solely containment measures were mentioned without a health impact association. Studies about the nature of COVID-19 disease and treatment methods were excluded. Also, news reports not published in scientific journals were excluded. To reduce bias, all titles and abstracts were initially screened for eligibility by two independent reviewers, with a third available in case of doubt. This was followed by full-text screening by two independent reviewers. The decision-making process on the inclusion of studies was done by mutual agreement of the two reviewers. The following data was abstracted, mapped, and coded for descriptive content analysis: (i) title, (ii) first author, (iii) year of publication, (iv) focus country, (v) scale level, (vi) type of study, (vii) type of containment measure(s) affecting the health and healthcare of children, (viii) main findings.

3 | RESULTS

Figure 1 and Table 1 show that 796 studies were identified, of which 462 were removed as duplicates.^{7,8} After title and abstract screening, another 239 studies were excluded. After reading the remaining 95 studies, 70 met the inclusion criteria and were used for descriptive content analysis.

TABLE 1 Key search terms and databases

Field	Search terms	Pubmed	Embase	Web of science
Population	child OR children OR pediatric OR paediatric	256,806	332,733	263,216
Concept	COVID-19 OR SARS-CoV-2 OR severe acute respiratory syndrome coronavirus 2 OR 2019 NCOV	289,150	312,414	247,358
Context	East Africa OR East-Africa OR Eastern Africa OR EAC OR British Indian Ocean Territory OR Burundi OR Comoros OR Djibouti OR Eritrea OR Ethiopia OR French Southern Territories OR Kenya OR Madagascar OR Malawi OR Mauritius OR Mayotte OR Mozambique OR Réunion OR Rwanda OR Seychelles OR Somalia OR South Sudan OR Uganda OR Tanzania OR Zambia OR Zimbabwe	30,302	32,084	47,190
PCC ^a	Population AND Concept AND Context	389	223	184

^aPCC, Population Concept Context guidelines of Arksey and O'Malley.

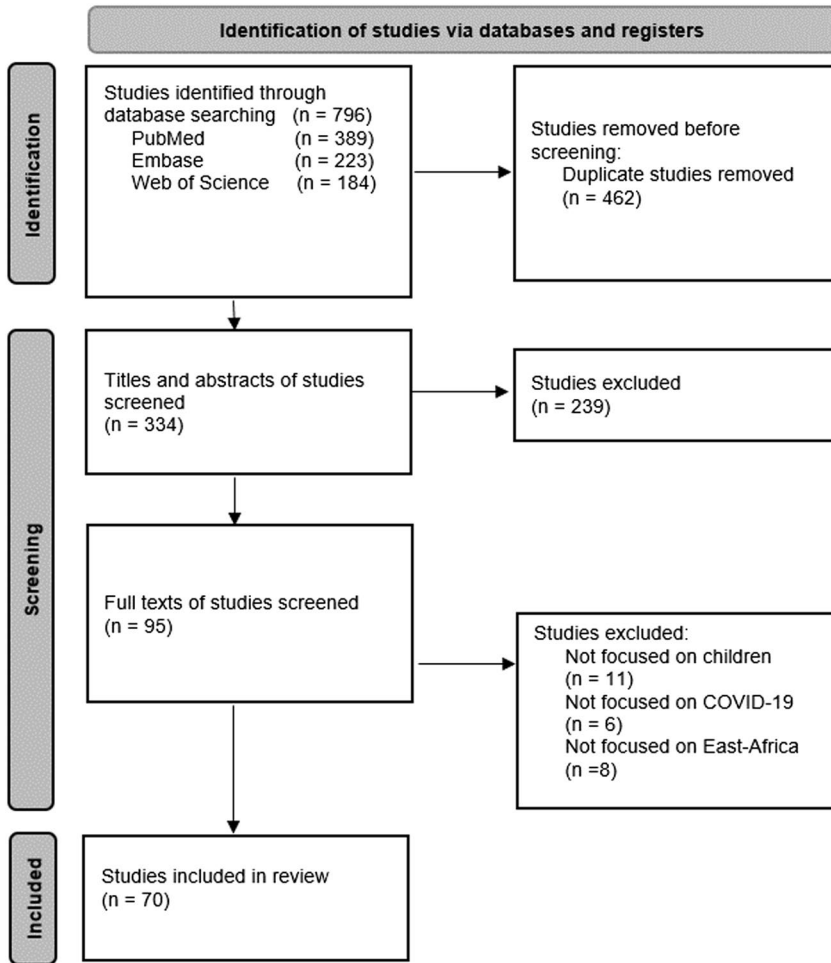


FIGURE 1 PRISMA flow diagram for the scoping review process. Figure 1 was created by the first author Ibrahim El Salih. He used the standard format available from: <http://prisma-statement.org/prismastatement/flowdiagram.aspx> and referred to the original author and source in the text.

The presence, meanings and relationships of two major themes (COVID-19 containment measures, indirect effects of COVID-19 containment measures), eight concepts of COVID-19 containment measures affecting the health and healthcare of children (lockdowns, school closures, physical distancing, travel restrictions, business closures, stay-at-home orders, curfews, quarantine measures with contact tracing) and seven concepts of its indirect effects (economic damage, limited access to education, food insecurity, child abuse, limited access to healthcare, disrupted health-programs, mental health challenges) were quantified and analysed.

Table 2 and Table 3 present the characteristics of these 70 studies.^{6,10-78} Scale level: national ($n = 49$), regional ($n = 21$). Type of studies: original research ($n = 58$), reviews ($n = 12$). Years published: 2020 ($n = 10$), 2021 ($n = 33$), 2022 ($n = 27$).

3.1 | COVID-19 containment measures in East-Africa

The 70 studies describe 8 implemented COVID-19 containment measures affecting the health and healthcare of children in 12 East-African countries: lockdowns ($n = 52$), school closures ($n = 47$), physical distancing ($n = 37$), travel

TABLE 2 Characteristics of studies included in scoping review on the impact of COVID-19 measures on the health and healthcare of children in East-Africa ($n = 70$).

General	Characteristics	Number of studies (%)
Inclusion	Total number of studies	70 (100%)
East-Africa ^a	12/22 countries and territories (55%): Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, South Sudan, Tanzania, Uganda, Zambia, Zimbabwe	70 (100%)
Year	2020	10 (14%)
	2021	33 (47%)
	2022	27 (39%)
Scale level	National	49 (70%)
	Regional	21 (30%)
Type of study	Original research	58 (83%)
	Review	12 (17%)
Theme	COVID-19 containment measures	70 (100%)
Concepts	- Lockdowns	52 (74%)
	- School closures	47 (67%)
	- Physical distancing	37 (53%)
	- Travel restrictions	30 (43%)
	- Business closures	22 (31%)
	- Stay-at-home orders	20 (29%)
	- Curfews	15 (21%)
	- Quarantine measures with contact tracing	12 (17%)
Theme	Indirect effects of COVID-19 containment measures	70 (100%)
Concepts	- Economic damage	26 (37%)
	- Limited access to education	21 (30%)
	- Food insecurity	22 (31%)
	- Child abuse	12 (17%)
	- Limited access to healthcare	39 (56%)
	- Disrupted health-programs	28 (40%)
	- Mental health challenges	13 (19%)

^aPopulation of East-Africa: 459 million.

restrictions ($n = 30$), business closures ($n = 22$), stay-at-home orders ($n = 20$), curfews ($n = 15$), quarantine measures with contact tracing ($n = 12$).

Containment measures of different kinds have been implemented in East-Africa at the beginning of the pandemic in March 2020. These containment measures were implemented to slow down the spread of COVID-19 infections and thus limit COVID-19 mortality and reduce pressure on already fragile health systems. Although the authors of the studies acknowledge that containment measures can reduce transmission of COVID-19 infections, most of its implementations are questioned.¹⁰⁻¹⁸ A concern is raised regarding the demographics of East-Africa. East-Africa has a relatively young population, leaving them at lower risk of severe COVID-19 illness.¹⁹ In addition, the socioeconomic systems of East-African countries were fragile before COVID-19.^{6,20} Implementing severe containment measures which reduces economic activity, educational attainment, and mobility may have long-term consequences.^{11-13,15,17,19-32} Furthermore, resources in healthcare are being redirected to COVID-19 care, putting more pressure on already under-resourced maternal and childcare.^{19,33} Governments implemented similar types of containment measures across East-Africa. The authors nonetheless mention that containment measures should

TABLE 3 Characteristics of COVID-19 containment measures and indirect effects per study (n = 70)

First author	Reference	Year	Countries	Scale level	Type of study	Lock-downs	School Closures	Physical distancing	Business closures	Quarantine/contact tracing	Travel restrictions	Stay-at-home order	Economic damage	Limited access to education	Limited access to healthcare	Child abuse	Food insecurity	Disrupted health programs	Mental health challenges
Govender et al.	⁶	2020	Eastern Africa	National	Review	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Burt et al.	¹⁰	2021	Uganda	Regional	Original research	X									X	X		X	
Kimani et al.	¹¹	2020	Kenya	National	Review	X	X	X	X						X	X		X	
Tafese et al.	¹²	2022	Ethiopia	Regional	Original research	X	X	X	X	X	X						X		
Pires et al.	¹³	2021	Mozambique	Regional	Original research			X			X				X				
Desta et al.	¹⁴	2021	Ethiopia	Regional	Original research	X	X	X	X	X	X				X	X		X	
Shumba et al.	¹⁵	2020	Kenya	National	Review	X	X	X	X	X		X	X	X	X	X	X	X	X
Rockowitz et al.	¹⁶	2021	Kenya	National	Original research	X	X	X	X	X	X					X			
Ahmed et al.	¹⁷	2022	Ethiopia Somalia Uganda Madagascar Malawi	National	Original research	X	X	X	X	X	X	X			X			X	
Gebreegziabher et al.	¹⁸	2022	Ethiopia	Regional	Original research	X	X	X	X	X	X	X			X			X	
Saasa et al.	¹⁹	2020	Zambia	National	Review		X		X				X	X					
Josephson et al.	²⁰	2021	Ethiopia Malawi Uganda	National	Original research	X	X	X	X	X	X	X	X	X	X				
Shapira et al.	²¹	2021	Somalia Malawi	National	Original research	X							X		X			X	
Angwenyi et al.	²²	2021	Kenya	National	Original research	X	X	X	X	X	X	X	X	X	X				X
El Salih et al.	²³	2022	Kenya	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mkupete et al.	²⁴	2022	Tanzania	National	Original research	X		X	X	X	X	X	X	X	X				

TABLE 3 (Continued)

First author	Reference	Year	Countries	Scale level	Type of study	Lock-downs	School Closures	Physical distancing	Curfew	Business closures	Quarantine/contact tracing	Travel restrictions	Stay-at-home order	Economic damage	Limited access to education	Food insecurity	Child abuse	Limited access to healthcare	Disrupted health programs	Mental health challenges
Egger et al.	²⁵	2021	Kenya Rwanda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Krauss et al.	²⁶	2022	Mozambique	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Singal et al.	²⁷	2021	Malawi	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kim et al.	²⁸	2021	Ethiopia	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Uwizeyimana et al.	²⁹	2022	Rwanda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Makiyi et al.	³⁰	2021	Malawi	National	Review	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mbazzi et al.	³¹	2022	Uganda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Carmichael et al.	³²	2022	Ethiopia	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Musimenta et al.	³³	2022	Uganda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Abagero et al.	³⁴	2022	Ethiopia	National	Review	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Murewanhema et al.	³⁵	2020	Zimbabwe	National	Review	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kawala et al.	³⁶	2020	Uganda	National	Review	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tegegne et al.	³⁷	2021	Ethiopia	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bell et al.	³⁸	2020	Uganda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bliznashka et al.	³⁹	2022	Mozambique	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Atim et al.	⁴⁰	2021	Uganda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(Continues)

TABLE 3 (Continued)

First author	Reference	Year	Countries	Scale level	Type of study	Lock-downs	School Closures	Physical distancing	Curfew	Business closures	Quarantine/contact tracing	Travel restrictions	Stay-at-home order	Economic damage	Limited access to education	Food insecurity	Child abuse	Limited access to healthcare programs	Disrupted health	Mental health challenges
Mathew et al.	⁴¹	2020	Zambia	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Piper et al.	⁴²	2022	Zimbabwe	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Workicho et al.	⁴³	2021	Ethiopia	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kiarie et al.	⁴⁴	2022	Kenya	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Connolly et al.	⁴⁵	2022	Malawi	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Klazura et al.	⁴⁶	2022	Uganda	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Milad et al.	⁴⁷	2022	Uganda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Wanyana et al.	⁴⁸	2021	Rwanda	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kidman et al.	⁴⁹	2022	Malawi	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lusambili et al.	⁵⁰	2020	Kenya	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Jarman et al.	⁵¹	2021	Kenya	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Esho et al.	⁵²	2022	Kenya Uganda Ethiopia	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kallander et al.	⁵³	2021	Tanzania	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hearst et al.	⁵⁴	2021	Zambia	Regional	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

TABLE 3 (Continued)

First author	Reference	Year	Countries	Scale level	Type of study	Lock-downs	School Closures	Physical distancing	Business closures	Quarantine/contact tracing	Travel restrictions	Stay-at-home order	Economic damage	Limited access to education	Food insecurity	Child abuse	Limited access to healthcare	Disrupted health programs	Mental health challenges
Yukich et al.	⁵⁵	2021	Ethiopia	National	Original research	X	X						X				X		
Mayoko et al.	⁵⁶	2022	Zimbabwe	National	Original research	X	X	X			X			X					
Delbiso et al.	⁵⁷	2021	Ethiopia	Regional	Original research		X							X	X	X			
Sharpe et al.	⁵⁸	2021	Zambia	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Assefa et al.	⁵⁹	2021	Ethiopia	National	Original research	X	X	X						X	X	X	X	X	
Nganjije et al.	⁶⁰	2021	Rwanda	National	Review	X	X	X		X						X			
Mbulayi et al.	⁶¹	2021	Zimbabwe	National	Original research	X	X	X			X	X				X	X		X
Sserwanya et al.	⁶²	2020	Uganda	National	Review	X	X									X			X
Stevens et al.	⁶³	2021	Kenya	National	Review	X	X		X							X			
Shuka et al.	⁶⁴	2022	Ethiopia	Regional	Original research	X				X	X						X		
Amouzou et al.	⁶⁵	2022	Ethiopia Kenya Tanzania Uganda Zambia	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Kassie et al.	⁶⁶	2021	Ethiopia	Regional	Original research	X	X	X		X	X	X				X	X	X	
Bekele et al.	⁶⁷	2022	Ethiopia	Regional	Original research	X	X	X		X	X	X				X	X	X	
Shikuku et al.	⁶⁸	2021	Kenya	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Arsenault et al.	⁶⁹	2022	Ethiopia	National	Original research	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(Continues)

TABLE 3 (Continued)

First author	Reference	Year	Countries	Scale level	Type of study	Lock-downs	School Closures	Physical distancing	Curfew	Business closures	Quarantine/contact tracing	Travel restrictions	Stay-at-home order	Economic damage	Limited access to education	Food insecurity	Limited healthcare	Disrupted health programs	Mental health challenges
Chimsimbe et al.	⁷⁰	2022	Zimbabwe	National	Original research	X		X							X				
Thekkur et al.	⁷¹	2021	Malawi	National	Original research	X			X						X				
Park et al.	⁷²	2022	Zambia	National	Original research	X									X				
Belay et al.	⁷³	2021	Ethiopia	National	Original research										X				
Chaziya et al.	⁷⁴	2021	Malawi	Regional	Original research		X								X				
Miretu et al.	⁷⁵	2021	Ethiopia	Regional	Original research	X	X	X		X								X	
Jimma et al.	⁷⁶	2021	Ethiopia	Regional	Original research													X	
Berjajou et al.	⁷⁷	2022	Zimbabwe	National	Review													X	
Gaythorpe et al.	⁷⁸	2021	Ethiopia Kenya South Sudan	National	Original research			X				X						X	

be adapted to the local context and cannot be implemented in every country or region due to the indirect effects that occur. The measures should be targeted and contextualised. Not all regions in East-Africa have the resources to facilitate these restrictions.^{6,10,11,14,15,17,23-29,31,34-39} The authors also mention that the strategy of governments revolved too much on limiting the spread of COVID-19 while losing sight of the impact this may have on vulnerable populations. The focus was put too much on policies for adult care and not on maternal and childcare.^{24,28,32,33,40,41} A holistic approach is needed that considers both the direct effects of the virus threat as well as the socioeconomic and health-related indirect effects.^{27,35} A nuance to this is that when containment measures are implemented, also relief measures need to be implemented to mitigate the socioeconomic indirect effects that may occur.^{6,10,17,21-25,27,30,32,35,38,42-44} Not all countries implemented strict containment measures.²⁴ Countries also did not implement strict containment measures during the entire phase of the pandemic. After a few months, governments eased measures and adapted them to the local context. Nonetheless, the indirect effects already occurred and will outlive the COVID-19 pandemic.^{11,24} These indirect effects concern economic damage, reduced access to education, food insecurity, child abuse, reduced access to healthcare, reduced access to health programs, and mental health challenges.^{6,10-47} Specific vulnerable subpopulations such as children will face these indirect effects on a larger extent.^{6,23,27,31,46,47}

The consensus is that COVID-19 containment measures could minimise COVID-19 spread but have adverse indirect effects on children in East-Africa.

3.2 | Indirect effects of COVID-19 containment measures in East-Africa

The 70 studies mention 7 indirect effects of COVID-19 containment measures on the health and healthcare of children in 12 East-African countries: economic damage ($n = 26$), limited access to education ($n = 21$), food insecurity ($n = 22$), child abuse ($n = 12$), limited access to healthcare ($n = 39$), disrupted health-programs (28), mental health challenges ($n = 13$).^{6,10-78}

3.2.1 | Economic damage

The impact of COVID-19 containment measures on East-African economies is addressed in 26 studies.^{6,14,15,19-26,28,31,33,36,39,41,47-55} Scale level: national ($n = 19$), regional ($n = 7$). Type of studies: original research ($n = 22$), reviews ($n = 4$).

The studies report similar phenomena. Before the COVID-19 pandemic, the unemployment rate in East-Africa was already high. Most people rely on the informal sector for income or have low-paid daily contracts.⁶ During the pandemic, East-African economies worsened with increased poverty levels, inflation, and debt ratios due to business closures and mobility restrictions. Business closures have resulted in a loss of income both in the formal and informal sector whereas mobility restrictions such as lockdowns, physical distancing, travel restrictions, stay-at-home orders, and curfews have resulted in a reduced access to services and markets.^{14,21-23,25,26,28,31,33,36,47-52}

Children suffer from this reduction in household income. Studies conducted in Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, and Zambia have reported increased levels of food insecurity due to this drop in household income.^{6,15,19,20,24-26,39,41,51-54} Furthermore, because of this drop in household income, future human capital evaporates as children are more likely to drop out of school to support their household through child labour.^{41,55}

All 26 studies mention that East-African countries had similar economies and imposed similar government containment measures during the pandemic. Only Tanzania imposed relatively mild restrictions. But the negative economic impacts were even then significant.²⁴ Consensus in all studies is that the economic impact of COVID-19 measures increases inequalities and could have far-reaching consequences on East-African children.

3.2.2 | Limited access to education

The impact of containment measures on education for East-African children has been addressed in 21 studies.^{6,15,19,20,23,25–32,42,47,49,53,55–58} Scale level: national ($n = 18$), regional ($n = 3$). Type of studies: original research ($n = 17$), reviews ($n = 4$).

Closure of schools and universities has major implications for children in East-Africa. Studies particularly focussed on Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe. During the closures of schools, children experienced lower levels of education or no education at all due to a lack of sufficient infrastructure.^{20,29,31,42,56} Particularly children from impoverished households face challenges as homeschooling requires access to electricity, electronic devices, and the Internet.⁶ Furthermore, illiterate caretakers face difficulties in home schooling their children.²⁸ Education interruption also deprives children of developing social skills.²⁷ When schools reopened, dropouts occurred.^{49,53} Girls are more likely to drop out of school due to chores that need to be done at home and child marriages.^{26,49,53} School closures thus importantly impact children their educational attainment and human capital for the years to come, increasing existing inequalities.^{6,19,25,27,28,32,49}

Next to learning losses, children suffer from food insecurity due to school closures. It is common in East-African public schools to have government-sponsored food programs. Access to these programs decreases due to the closure of schools in combination with mobility restrictions such as lockdowns, physical distancing, travel restrictions, stay-at-home orders, and curfews.^{6,15,57} Poor nutrition among children is associated with worse educational outcomes, weakened immune systems, susceptibility to opportunistic infections, and premature mortality.⁶

School closures in combination with stay-at-home orders have also increased child abuse. When children spend more time at home, they are at greater risk of being exposed to domestic violence as caretakers experience stress from the pandemic and COVID-19 measures.^{6,15} This applies particularly to children with cognitive and physical disabilities.⁵⁸ The increased pressure and lack of education have led to increased mental health problems, such as depression, among children and their caretakers.^{6,15,27,30,58} Without school to attend, early pregnancy and child marriage rise.^{26,47,55} Furthermore, the supply of blood-products depends on blood-donations of students. With school and university closures a shortage of blood-products evolved, which increases preventable mortality.²³

The studies recommend governments and policy makers to keep schools open as children are at low risk of contracting or suffering from COVID-19. School closures should be seen as a last resort to mitigate virus spread.³⁰

3.2.3 | Food insecurity

The impact of COVID-19 containment measures on food insecurity for East-African children has been addressed in 22 studies.^{6,12,14,15,20,22–28,33,39,41,43,51,53,54,57–59} Scale level: national ($n = 14$), regional ($n = 8$). Type of studies: original research ($n = 20$), reviews ($n = 2$).

Due to the COVID-19 containment measures and the resulting economic decline, hunger exacerbated in East-Africa. Studies derived especially from Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda and Zambia. Food prices went up while the income of people working in the informal sector decreased.^{6,15,51} Closure of businesses in combination with mobility restrictions has led to the inability to access markets.^{20,25,33,39,41,58} School feeding programs and government food distribution declined.^{6,15,59} Especially vulnerable children with mental or physical disabilities are at risk.²⁷

Food insecurity limits available nutritional choices for children which causes malnutrition, stunting, weakened immune systems, susceptibility to opportunistic infections, premature mortality and preventable death.^{6,12,14,23,24,28,43,51,53} In addition, food insecurity leads to economic losses, worse educational outcomes, and an increase in child labour as children try to find means to purchase food or beg on the streets.^{54,57} All these factors have a relation with increased mental health problems among children.^{15,22} Households, including children must choose between following the containment measures and risking hunger and starvation, or ignoring the containment measures and risking contracting COVID-19.^{20,26}

The studies provide similar recommendations to governments and policy makers. Food insecurity affects all layers of society.¹⁵ Prevention measures could include cash transfers to lower-income households.^{6,15} School and government feeding programs should be re-introduced and vulnerable children monitored. Investments are required to keep food prices low.⁶

3.2.4 | Child abuse

The impact of COVID-19 containment measures on child abuse in East-Africa has been addressed in 12 studies.^{6,15,16,25,36,52,55,57,60-63} Scale level: national ($n = 11$), regional ($n = 1$). Type of studies: original research ($n = 6$), reviews ($n = 6$).

Lockdowns, stay-at-home orders, and curfews have led to an increase in neglect, sexual abuse and violence against children in Ethiopia, Kenya, Rwanda, Uganda and Zimbabwe. Business and school closures disrupt daily routines and force people to spend long periods together in cramped living-spaces.⁶⁰ Especially children with disabilities are subject to neglect and abuse.¹⁵ The disruption of daily routines harms children also in another way as schools often perform as centres for reporting child abuse.^{6,15} The closure of schools results in developmental delays and non-communicable diseases later in life.^{6,15} Because of financial constraints and food insecurity, children are more often subject to ending up on the street and performing child labour.^{36,57,61} Child marriage increases as well because of financial constraints and food insecurity.⁵² In regions in East-Africa excess child marriage due to the COVID-19 pandemic could continue until 2035.⁵⁵ Especially vulnerable children and girls are at risk of child abuse.⁶²

Interventions by the justice and legal system, the health system, and civil societies to protect children from child abuse have been hindered by the COVID-19 containment measures.⁵²

3.2.5 | Limited access to healthcare

The impact of COVID-19 containment measures on the access to healthcare for East-African children has been addressed in 39 studies.^{6,10,11,13-15,17,18,21,23,25,31,33-35,38-40,43-48,50,53,54,59,64-74} Scale level: national ($n = 26$) regional ($n = 13$). Type of studies: original research ($n = 34$), reviews ($n = 5$).

Studies from Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, Tanzania, Uganda, Zambia and Zimbabwe illustrate that East-African health-systems are insufficiently equipped against strict COVID-19 measures.^{6,10,11,13-15,17,18,21,23,25,31,33-35,38-40,43-48,50,53,54,59,64-74} Disruptions in maternal and child health services have occurred due to lockdowns and economic decline in both inpatient and outpatient care.^{64,65} Family planning visits, C-sections, antenatal visits, postnatal care, hospital deliveries, and safe abortions all declined compared to before the COVID-19 pandemic.^{10,13,15,18,21,40,44,48,64-67} While adverse pregnancy outcomes such as stillbirth, low birthweight, and premature infant births increased.^{10,14,64,66,68} Less people seek healthcare because of travel barriers or disease transmission concerns.^{11,33,50,59,69} Studies underline that less children are being treated for pneumonia, diarrhoea, and malaria.^{10,18,44} Screenings for cancer, tuberculosis, and testing for human immunodeficiency virus and malaria all decreased.^{6,14,23,38,44,70-72} Disruptions in paediatric oncology and surgery care occurred due to mobility restrictions. When less children come to the hospital, they die of preventable causes at home, or have diseases diagnosed in advanced stages.^{23,46,73}

Across East-Africa, a decline in health services provided has occurred.^{10,17,18,21,25,31,34,35,39,43,47,48,53,54,64,67,70} Excess mortality has occurred in children under the age of five and among mothers which is associated with a decline in the utilization of the essential health services.^{17,40,43,74} Outcomes vary however substantially between countries.¹⁷

3.2.6 | Disrupted health-programs for children

The impact of COVID-19 containment measures on health-programs in East-Africa has been addressed in 28 studies.^{6,10,11,14,15,17,18,21,23,25,34,35,37-40,44,45,48,59,65-67,69,75-78} Scale level: national ($n = 18$), regional ($n = 10$). Type of studies: original research ($n = 22$), reviews ($n = 6$).

Studies from Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, South Sudan, Tanzania, Uganda and Zimbabwe show that lockdowns, mobility restrictions, and increased poverty decreased people their access to these health-programs.^{6,15,25,34,39} Severe malnutrition increases the susceptibility to infectious diseases and worsens the health-outcomes for already existing diseases.^{6,15} Examples of disrupted programs concern bed-net distributions for malaria, immunizations, and paediatric oncology outreach-programs.^{21,23,38}

Lockdowns have caused immunisation clinics to close in combination with disruptions in supply chains, shortages of personal protective equipment, and transportation problems.^{6,35} In addition, vaccination services in East-Africa rely for a greater part on outreach campaigns which have been hindered by the pandemic and funding is redirected to tackle COVID-19.^{21,38,66} Mobility restrictions, financial constraints, and fear of contracting COVID-19 are considered the main drivers for a decrease in immunisation attendance for children.^{6,10,11,15,17,35,37,39,45,59,65,66,69,75,76} The disruption of immunisation programs increases the risk for children contracting infectious diseases.^{6,14} Disruptions have been reported in immunisation programs for diphtheria, tetanus toxoid, pertussis, Hepatitis B, influenza, tuberculosis, and measles.^{6,14,35,40,44,48,67,77,78} Disruptions in immunisation programs can lead to outbreaks in the future, evaporating the progress that some countries in East-Africa have made in the past decades.⁴⁸ One study describes for example, the outbreak of measles in Zimbabwe.⁷⁷ Even temporary disruptions in immunisation programs may lead to an additional health crisis. A study in Ethiopia mentions that the deaths prevented by maintaining immunisation programs outweigh the excess risk of COVID-19 deaths, especially for children.¹⁸

Projections show that the disrupted health-programs in the already weak East-African health-systems may lead to a significant increase in child and maternal mortality.^{6,17,18}

3.2.7 | Mental health challenges in children

The impact of COVID-19 containment measures on the mental health of East-African children has been addressed in 13 studies.^{6,15,22,23,27,28,30,31,47,54,58,61,62} Scale level: national ($n = 11$), regional ($n = 2$). Type of studies: original research ($n = 9$), reviews ($n = 4$).

Studies from Ethiopia, Kenya, Malawi, Uganda and Zambia confirm that the mental health of most children and caretakers is challenged during the pandemic. Mobility restrictions, financial constraints, food insecurity, lack of access to healthcare, and school closures have caused increased levels of stress, anxiety, depression, and loneliness.^{22,27,28,31,54,61} Continuous bad pandemic news and social isolation from friends and family worsen children their mental wellbeing.^{6,58} Elevated stress among parents can pass over to their children. This stress weakens immune-systems, increases susceptibility to communicable diseases, and leaves children at higher risk of non-communicable diseases later in life.⁶ Mental health services were already limited in East-Africa and this situation has exacerbated as funds have been redirected to COVID-19 care.^{22,62} Mobility restrictions further complicate the access to these scarce services. Due to disruption of their normal psychosocial development, children may suffer more mentally than older population groups during the pandemic, although they are at lower risk of suffering from the virus itself.³⁰ Children with chronic conditions are expected to face these challenges more severe.^{23,27,47} Chronic stress and anxiety may impact the children their hormones and brains, from which they may never fully recover.¹⁵

4 | DISCUSSION

This scoping review reveals that the impact of COVID-19 containment measures on the health and healthcare of children in East-Africa is considerable. Seven indirect effects were distinguished: economic damage, limited education

access, food insecurity, child abuse, limited healthcare access, disrupted health-programs, and mental health challenges. In most studies a change in indirect effects is investigated and compared to the period before the COVID-19 pandemic. The mentioning of positive effects due to the containment measures is limited. All included studies however do mention negative indirect effects of COVID-19 containment measures. These indirect effects are intertwined as illustrated in each chapter of our review. This intertwine confirms and amplifies the impact that COVID-19 containment measures have on socioeconomic and health systems. These indirect effects have the potential to influence each other continuously if no proper interventions are implemented.

Similar patterns of indirect effects are seen across East-Africa. This is because the demographics, economies, and policies to tackle COVID-19 are relatively similar in this region.^{6,17,20,65} Lockdowns and mobility restrictions were one of the first measures implemented to stop the spread of COVID-19. It is however now becoming clear that these policies could have adverse indirect effects. Already fragile social, economic, and medical systems are exacerbated.^{15,25,69} The economic decline functions as catalysator of education reduction, food insecurity, disruptions of communicable diseases programs, and mental health issues of both caretakers and children.^{22,23,25,37} This negative impact is expected to last for years. Decades of progress in East-Africa on decreasing poverty and increasing child and maternal care may be lost.^{17,40}

COVID-19 measures and its indirect effects are not unique to East-Africa. At the beginning of the pandemic, HIC and LMIC across the globe adapted similar policies to minimise COVID-19 spread.⁷⁹ The nature of the indirect effects that subsequently occurred was similar as well around the world. Economic loss, child abuse, loss of education, reduced healthcare access, psychological problems, and the diversion of resources to adult healthcare services are all reported.^{80,81} The difference herein is that the indirect effects in HIC do not occur at the same magnitude as in LMIC. Since the beginning of the COVID-19 pandemic, existing socioeconomic and medical inequalities between HIC versus LMIC have been highlighted and augmented.^{82,83} Nevertheless, only 35% of the current literature on this topic addresses LMIC.⁵

Strict measures, such as lockdowns, are not always feasible in LMIC with fragile socioeconomic and health-systems. Pandemic response strategies should be tailored to the local socioeconomic, geographic and demographic contexts in addition to the severity of the infectious disease. A holistic approach needs to be applied. If containment measures are required to halt virus transmission, relief arrangements should also be installed to limit the indirect effects. Such relief arrangements need to be adapted to local settings and could include food assisting programs, fiscal policies and cash transfers.^{6,15} In addition, guidelines need to be developed that ensure timely compliance of government leaders and policymakers with WHO instructions to lift lockdowns. Already in October 2020, the WHO urged governments not to use lockdowns as their primary method of controlling the spread of COVID-19, because lockdowns have a negative impact on individuals, communities and societies by disrupting social and economic life.^{4,17,69,84} However, governments insufficiently responded to this plea and continued to impose lockdowns. Finally, socioeconomic and health-systems need to be strengthened, particularly in resource-limited regions such as East-Africa. When these systems are strengthened children are better protected during the COVID-19 pandemic, after the pandemic, and in future pandemics.

This study has several limitations. Because it focuses on peer-reviewed studies, possibly relevant studies or reports in grey literature might have been excluded. Furthermore, causal relations between specific COVID-19 containment measures and indirect effects are challenging to infer. In addition, the full extent of indirect effects cannot be overseen yet. Future research is required once more time has passed. Especially because economic repercussions adversely affect the wellbeing and access to healthcare of children over the coming years.

5 | CONCLUSION

Based on the findings of this study, we recommend that government leaders and policy makers take the indirect effects of containment measures on the health and healthcare of children into account, especially in resource-limited regions such as East-Africa and apply a holistic approach. Whether to prioritise reducing COVID-19 transmission or

limiting adverse indirect effects need to be weighed carefully. Strengthening of socioeconomic and health-systems is warranted to protect the most vulnerable.

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CONFLICT OF INTEREST

None declared.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

ETHICS STATEMENT

Not applicable.

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