

Global COVID-19 Epidemiology and Impact on Children: what have we learnt?

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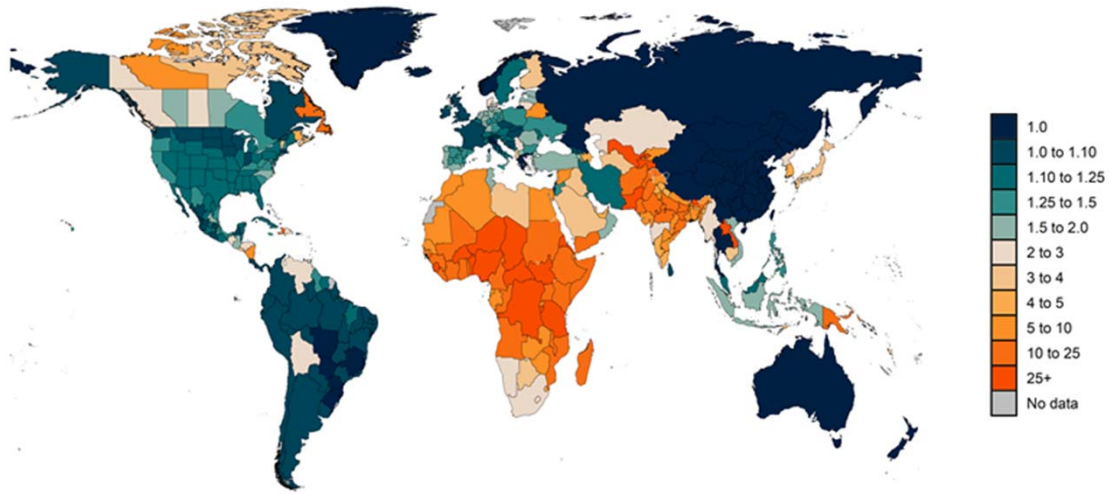


THE AGA KHAN UNIVERSITY

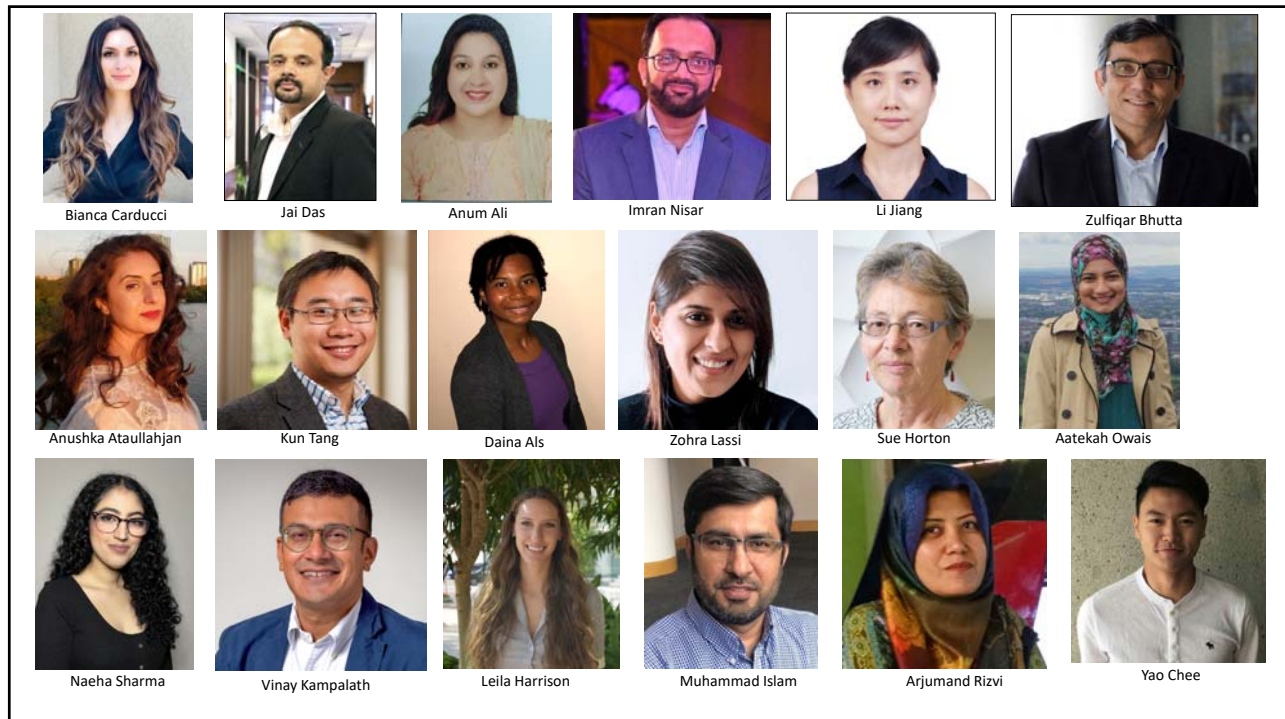
Global COVID Burden & Deaths (January 20, 2022)



Estimated ratio of total COVID-19 deaths to reported COVID-19 deaths



IHME (September 26, 2021)



Let's start with the mother...

journal of
global
health

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RESEARCH THEME 1:
COVID-19 PANDEMIC

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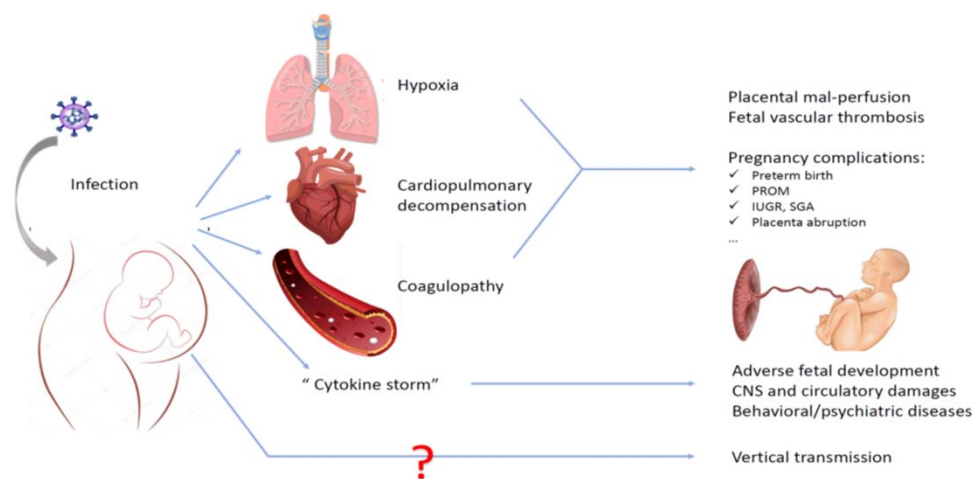
A systematic review and meta-analysis of data on pregnant women with confirmed COVID-19: Clinical presentation, and pregnancy and perinatal outcomes based on COVID-19 severity

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Jai K Das³, Rehana A Salam³,
Zahra A Padhani³, Omer Irfan⁴, Zulfiqar A Bhutta^{4,5}

Background We determined the clinical presentation, risk factors, and pregnancy and perinatal outcomes in pregnant women with confirmed COVID-19 and identified if these are different based on COVID-19 severity.

Methods We included all observational studies on pregnant women with confirmed COVID-19 reporting clinical presentation, risk factors, and pregnancy and peri-

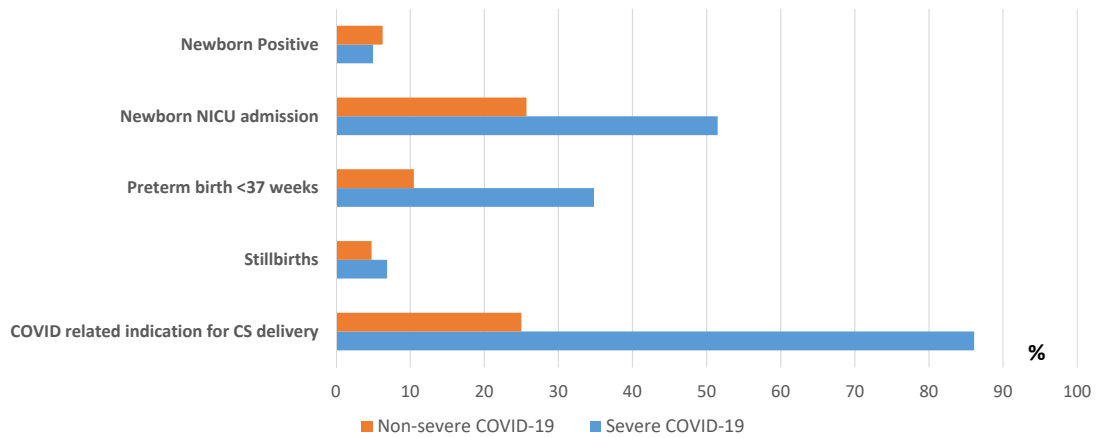
Possible pathophysiology for adverse pregnancy outcomes related to SARS-CoV-2 infection



Global distribution of 62 included studies (31,016 cases)



Pregnancy, birth and neonatal outcomes-based on COVID-19 disease severity cases (n=2743)



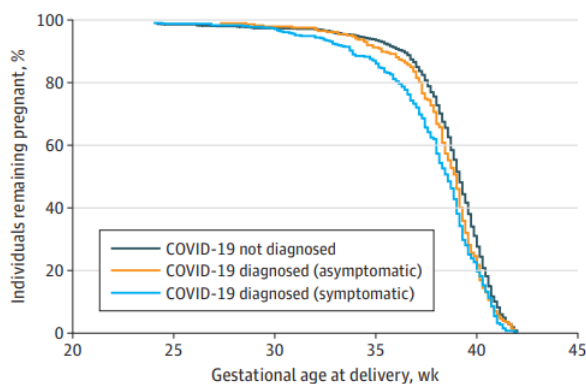
Research

JAMA Pediatrics | Original Investigation

Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection The INTERCOVID Multinational Cohort Study

José Villar, MD; Shabina Ariff, MD; Robert B. Gunier, PhD; Ramachandran Thiruvengadam, MD; Stephen Rauch, MPH; Alexey Kholin, MD; Paola Roggero, PhD; Federico Prefumo, PhD; Marynéa Silva do Vale, MD; Jorge Arturo Cardona-Perez, MD; Nerea Maiz, PhD; Irene Cetin, MD; Valeria Savasi, PhD; Philippe Deruelle, PhD; Sarah Rae Easter, MD; Joanna Sichitiu, MD; Constanza P. Soto Conti, MD; Ernawati Ernawati, PhD; Mohak Mhatre, MD; Jagjit Singh Teji, MD; Becky Liu, MBBS; Carola Capelli, MD; Manuela Oberto, MD; Laura Salazar, MD; Michael G. Gravett, MD; Paolo Ivo Cavoretto, PhD; Vincent Bizzor Nachinab, MD; Hadiza Galadanci, MSc; Daniel Oros, PhD; Adejumo Idowu Ayede, MD; Loic Sentilhes, PhD; Babagana Bako, MD; Mónica Savorani, MD; Hellas Cena, PhD; Perla K. García-May, MD; Saturday Etuk, MD; Roberto Casale, MD; Sherief Abd-Elsalam, PhD; Satoru Ikenoue, PhD; Muhammad Baffah Aminu, MD; Carmen Vecciarelli, MD; Eduardo A. Duro, MD; Mustapha Ado Usman, MBBS; Yetunde John-Akinola, PhD; Ricardo Nieto, MD; Enrico Ferrazi, MD; Zulfiqar A. Bhutta, PhD; Ana Langer, MD; Stephen H. Kennedy, MD; Aris T. Papageorgiou, MD

Figure. Gestational Age at Delivery Among Women With COVID-19 Diagnosis, With and Without Symptoms, and Women Without COVID-19 Diagnosis



No. at risk	25	30	35	40	45			
COVID-19 not diagnosed	1391	1381	1371	1359	1318	1131	435	11
COVID-19 diagnosed (asymptomatic)	284	283	280	276	261	214	70	0
COVID-19 diagnosed (symptomatic)	407	403	399	382	355	267	92	1

Table 4. Adjusted Associations Between Maternal and Neonatal COVID-19 Diagnosis With Perinatal Morbidity and Mortality^a

Maternal and neonatal COVID-19 diagnosis	No. (%)	RR (95% CI)		
		SNMI ^b	SPMMI ^c	NICU stay ≥7 d
Not-diagnosed mother and neonate	1462 (66.7)	1 [Reference]	1 [Reference]	1 [Reference]
Diagnosed mother but neonate not tested	313 (14.3)	1.40 (0.72-2.70)	1.68 (1.20-2.37)	1.02 (0.60-1.83)
Diagnosed mother but test-negative neonate	362 (16.5)	4.00 (2.29-6.97)	2.31 (1.69-3.17)	3.13 (2.10-4.65)
Diagnosed mother and test-positive neonate	54 (2.5)	4.13 (1.69-10.08)	3.46 (2.13-5.63)	6.03 (3.35-10.86)

Abbreviations: NICU, neonatal intensive care unit; RR, relative risk; SNMI, severe neonatal morbidity index; SPMMI, severe perinatal morbidity and mortality index.

^a Models adjusted for country, month entering study, maternal age, and history of maternal morbidity (including diabetes, thyroid and other endocrine disorders, cardiac disease, hypertension, chronic respiratory disease, kidney disease, malaria, or tuberculosis).

^b SNMI includes at least 1 of the following morbidities: bronchopulmonary dysplasia, hypoxic-ischemic encephalopathy, sepsis, anemia requiring transfusion, patent ductus arteriosus, intraventricular hemorrhage, necrotizing enterocolitis, or retinopathy of prematurity.

^c SPMMI includes any of the morbidities listed in the SNMI, intrauterine or neonatal death, or NICU stay ≥7 days.

First Do No Harm (March 2021)

- Essential services must be maintained to identify mothers and newborns at risk and to minimize COVID related complications
- Pregnant women with COVID-19 are at an increased risk of critical illness and death compared to non-pregnant women
- Universal screening for COVID-19 should be offered to all pregnant women entering a health facility for delivery or undergoing a procedure
- Skilled and respectful care to mothers and newborns at all levels of care can improve outcomes
- Psychosocial support with attention to anxiety, depression, and intimate partner violence is critical for all pregnant women — especially during the COVID-19 pandemic

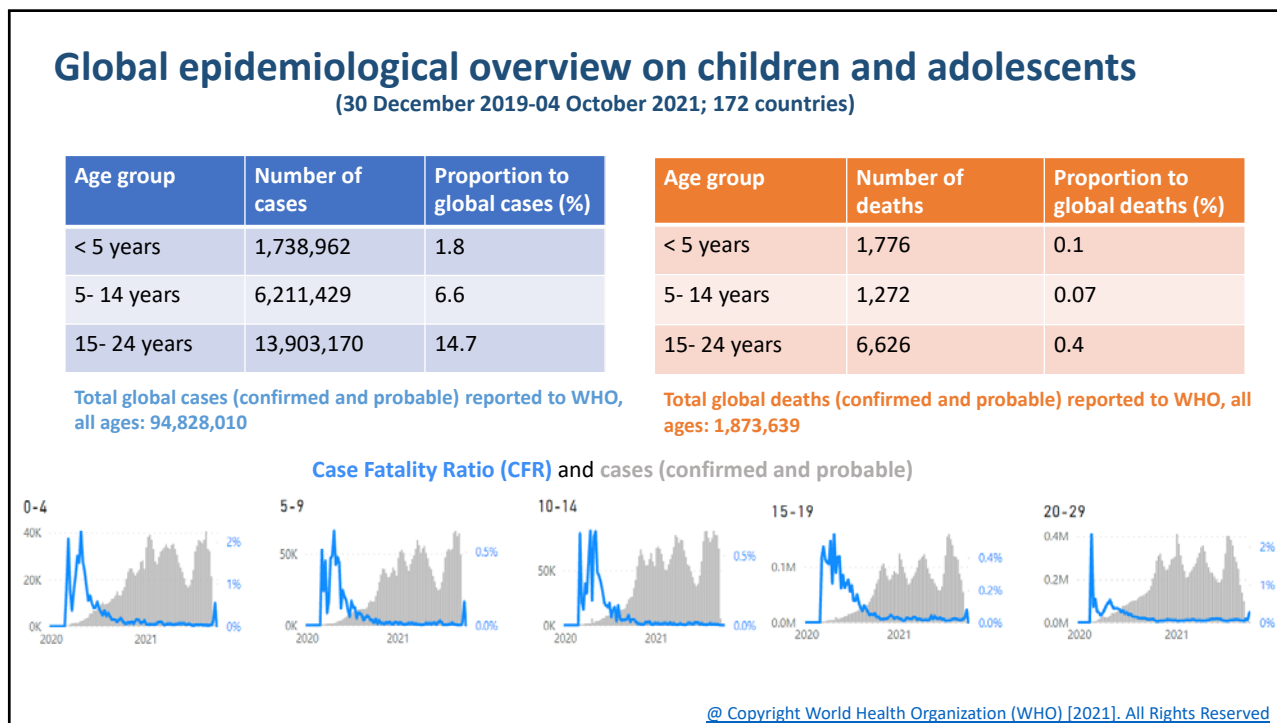
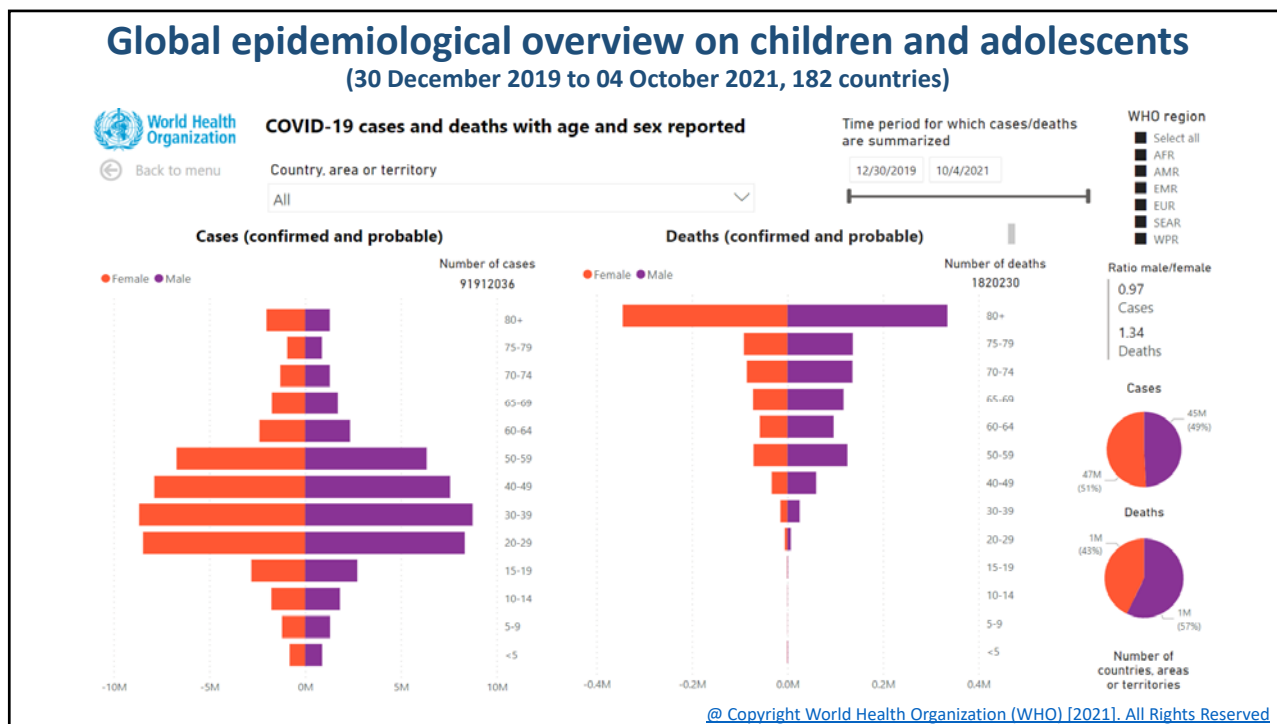


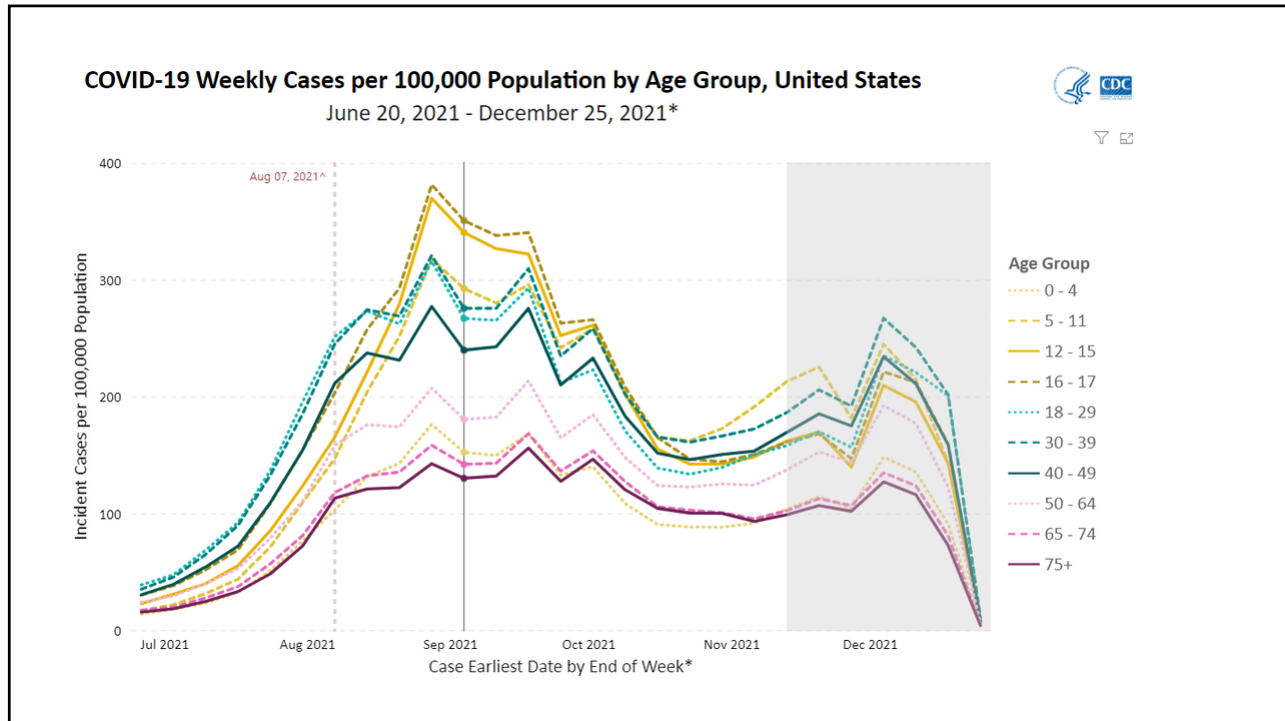
First Do No Harm (March 2021)

- SARS-CoV-2 infection in neonates is rare, and, if infected, the majority of newborn infants have either asymptomatic or mild disease with good prognosis
- Mothers, regardless of COVID-19 status, should not be separated from their infants unless they are too unwell to provide care
- The benefits of human milk outweigh any theoretical risk of infection. WHO recommends mothers with suspected or confirmed COVID-19 initiate breastfeeding within 1 hour of birth, wearing masks and practicing hand hygiene
- All newborn health care providers must be trained in recognizing newborn danger signs and should consider COVID-19 infection as part of differential diagnoses
- Pulse oximetry screening and safe use of oxygen are important considerations for small or sick newborns, including those suspected of COVID-19



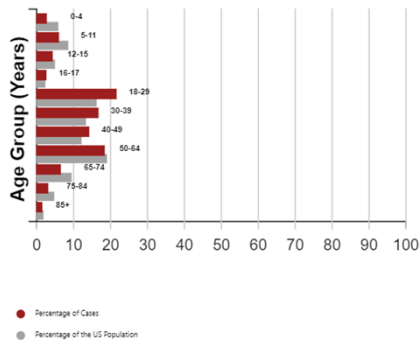
Children and COVID Direct Effects





Cases by Age Group:

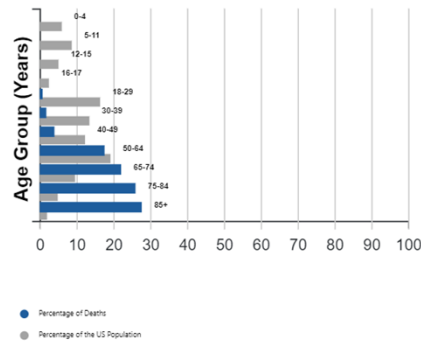
Data from 51,074,971 cases. Age group was available for 50,530,548 (98%) cases.



Show Percentage of the US Population that is in this demographic category

Deaths by Age Group:

Data from 723,978 deaths. Age group was available for 723,835 (99%) deaths.



Show Percentage of the US Population that is in this demographic category

COVID-19 mortality in children 0-17 years of age in the UK

Mortality by age and epoch

n (%)

Dependent: status	Jan - Aug 2020	Sept 20 - April 21	May - 13 Dec 21	14 Dec 21 - 6 Jan 22	
Age (years)	<1 y	7 (1.9)	8 (1.2)	6 (0.8)	0 (0.0)
	1 - 4 y	3 (1.3)	0 (0.0)	4 (1.1)	0 (0.0)
	5 - 11 y	0 (0.0)	1 (0.2)	1 (0.2)	1 (2.0)
	12 - 17 y	3 (1.1)	2 (0.3)	3 (0.4)	0 (0.0)

ISARIC4C collaborative (2022)
<https://www.gov.uk/government/publications/co-cin-child-admissions-and-severity-by-epoch-co-cin-update-january-2022-6-january-2022>

But ... is this true globally?

Joint IPA-UNICEF COVID-19 Information Brief
29 June 2020

Epidemiology, Spectrum, and Impact of COVID-19 on Children, Adolescents, and Pregnant Women


Introduction

The COVID-19 coronavirus 2019-nCoV pandemic with

COVID-19 and multisystem inflammatory syndrome in children and adolescents

Li Jiang, Kun Tang*, Mike...*


As severe acute respiratory syndrome reports from Europe COVID-19-associated inflammatory syndrome



Global child health

OPEN ACCESS

Clinical characteristics, treatment and outcomes of paediatric COVID-19: a systematic review and meta-analysis

Omar Irfan,¹ Fiona Muttalib,¹ Kun Tang,^{1,2} Li Jiang,¹ Zohra S Lassi,³ Zulfiqar Bhutta ^{1,4}

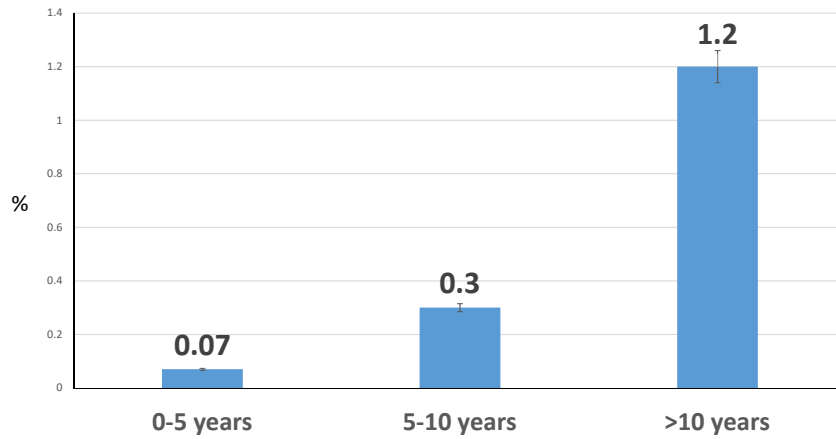
ABSTRACT
Objective Compare paediatric COVID-19 disease characteristics, management and outcomes according to World Bank country income level and disease severity.
Design Systematic review and meta-analysis.

International Concern, and on 11 March 2020, a pandemic. As of 21 January 2021, there have been over 95.6 million confirmed COVID-19 cases and over 2.0 million associated deaths from 216 countries, areas or territories.¹ Children under-19 years

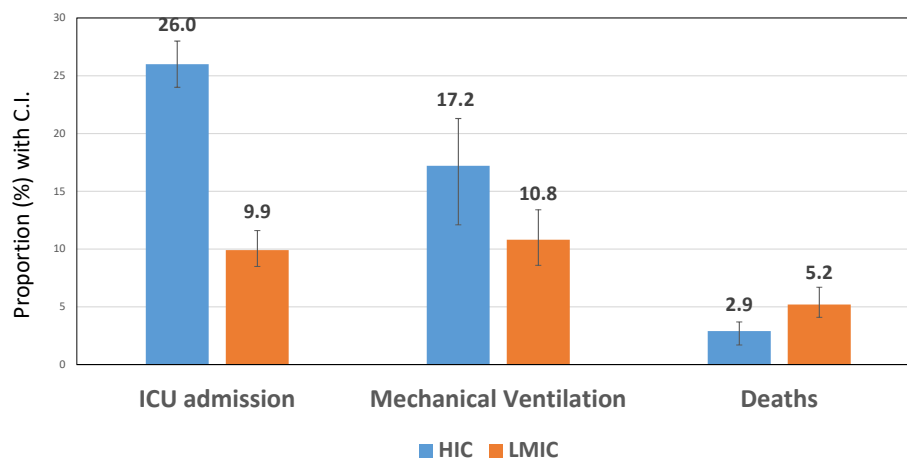
Arch Dis Child: first published as 10.1136/archdischild-2020-321385

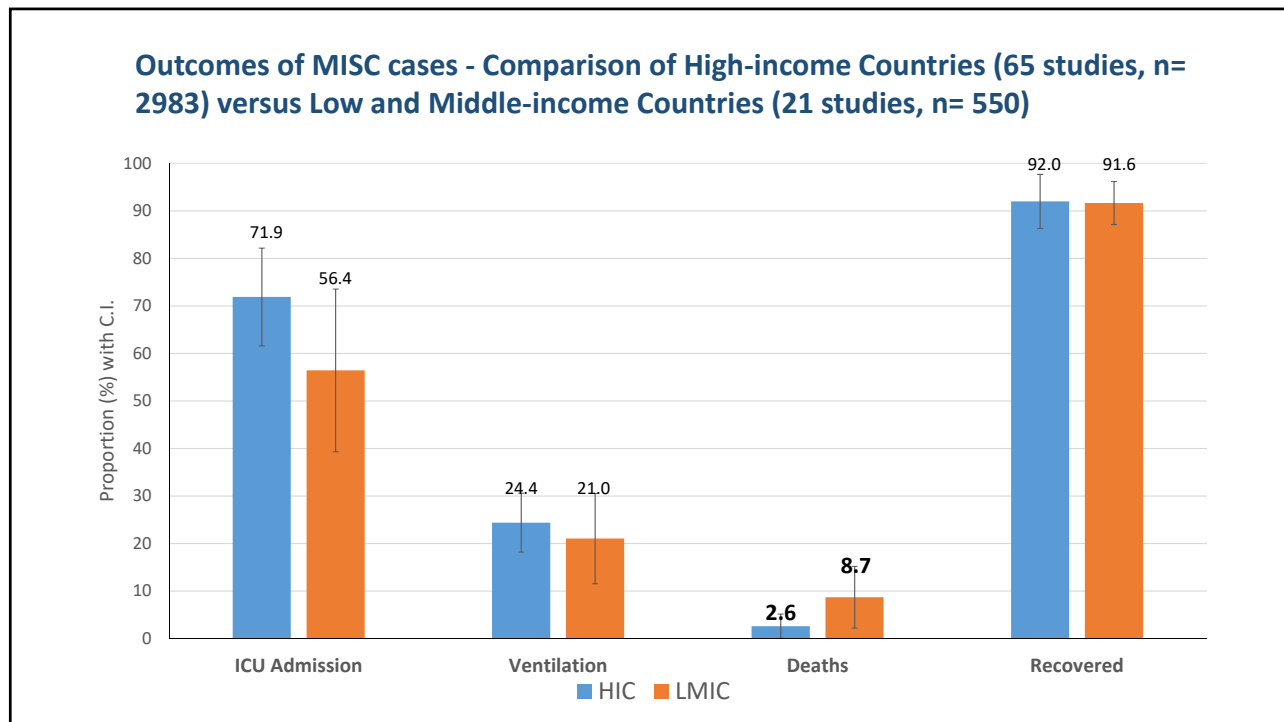


Child deaths (%) by age from 67 series of Pediatric COVID-19 cases



Outcomes among reported pediatric COVID-19 cases in HICs (n=6528, 60 studies) and LMICs (n=3723, 69 studies)





Current evidence re direct effects of COVID-19 in children (Summary)

- Disease infrequent in children compared to adults (but with a gradient across childhood with adolescent rates comparable to young adults). However
 - Like adults, adverse outcomes are more frequent in children with co-morbidities
 - MISC remains a consideration in a minority with as yet poor predictive patterns or risk factors
 - Adverse outcomes (severe disease and mortality) are **significantly higher** in LMICs compared to high-income settings
 - As yet long-term effects e.g. long covid, are uncertain in children
- Despite significant rise in pediatric cases, the recent delta wave upsurge has not changed disease severity & complications rates in children

WHO-nCoV-Sci-Brief-Children-and-adolescents-2021 & Irfan et al (2021a & b), Li et al (2021)

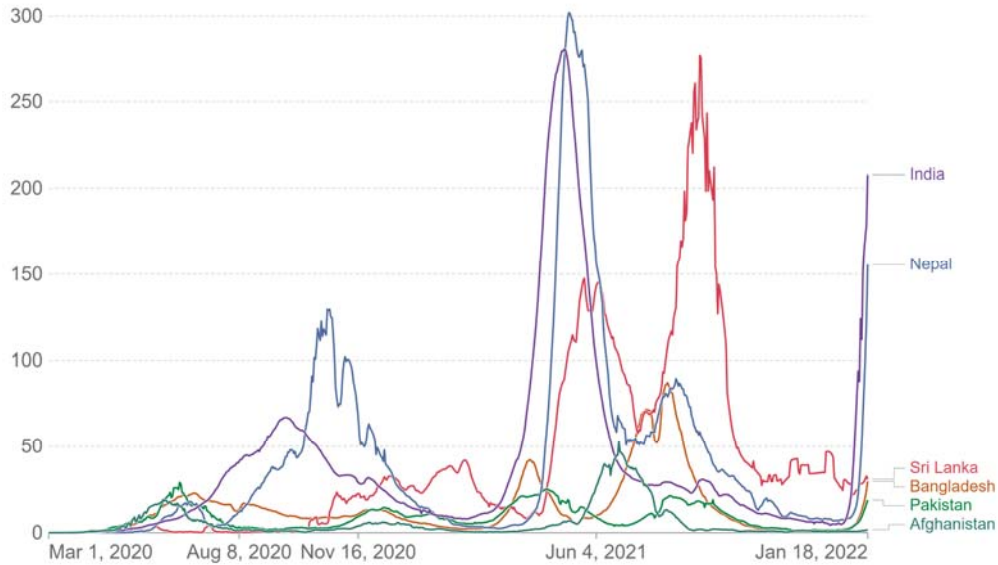
Direct & Indirect Effects of COVID-19 An analysis from South Asia



Daily new confirmed COVID-19 cases per million people

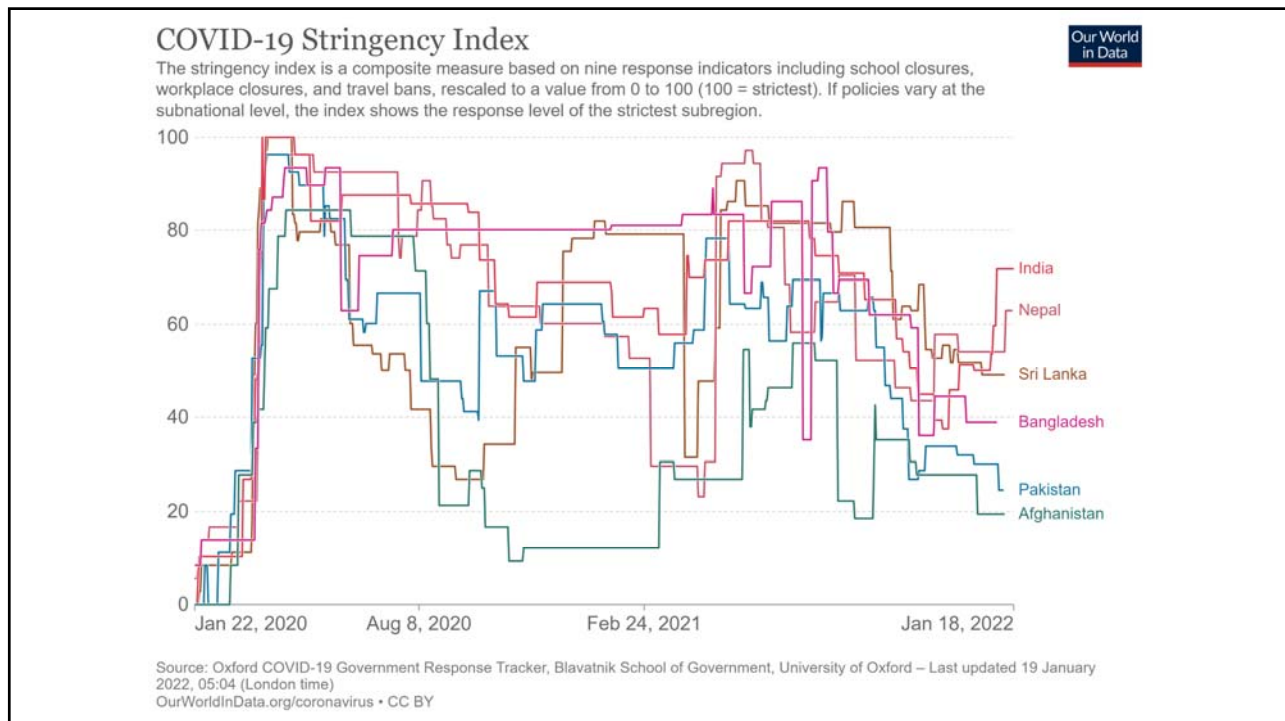
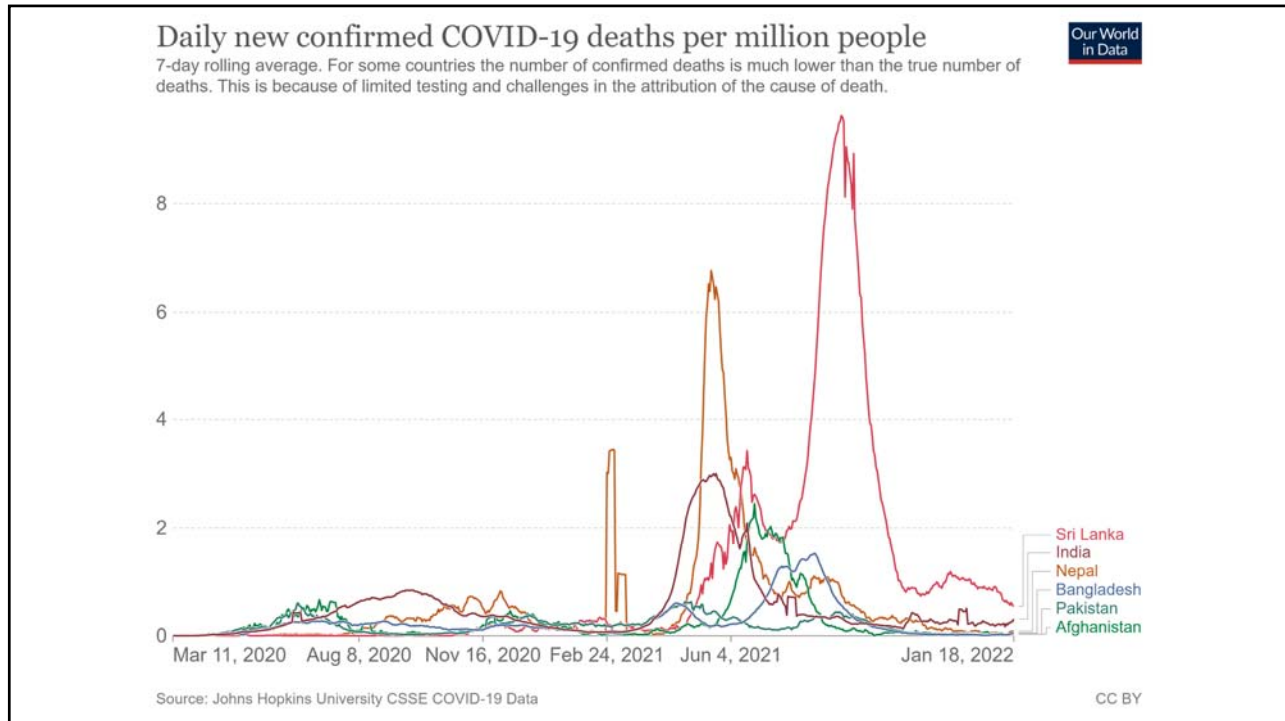
7-day rolling average. Due to limited testing, the number of confirmed cases is lower than the true number of infections.

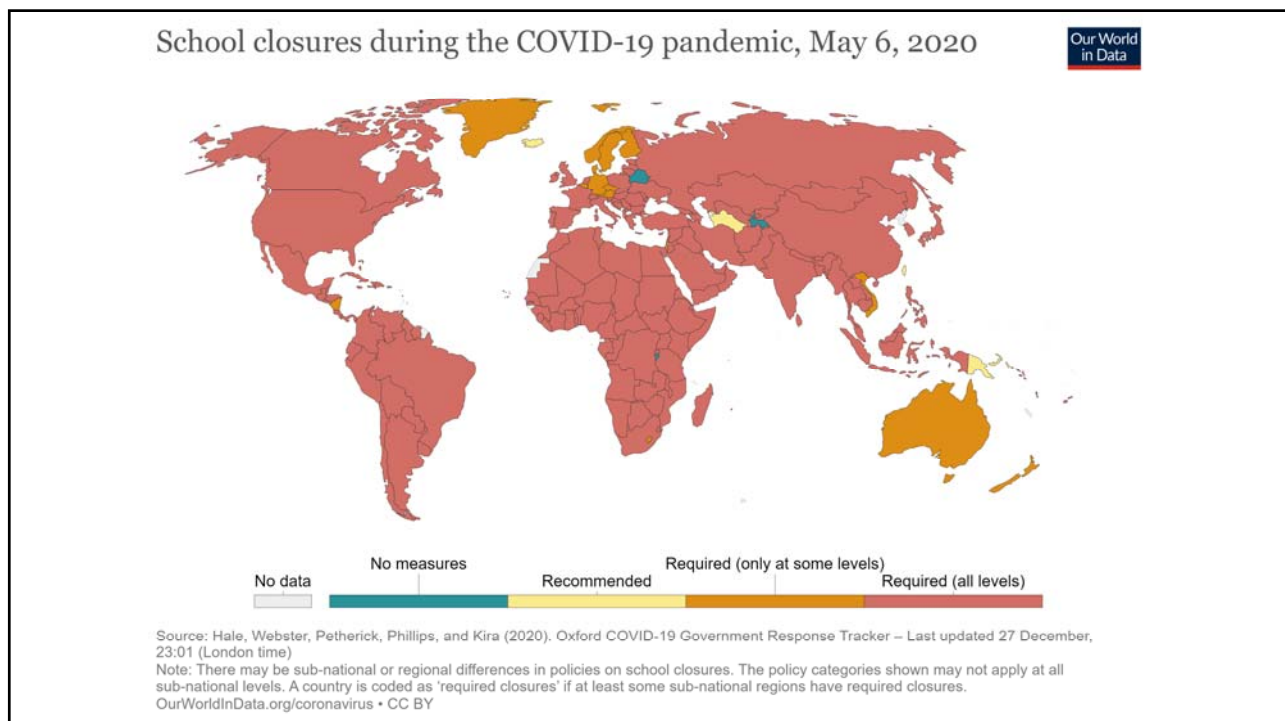
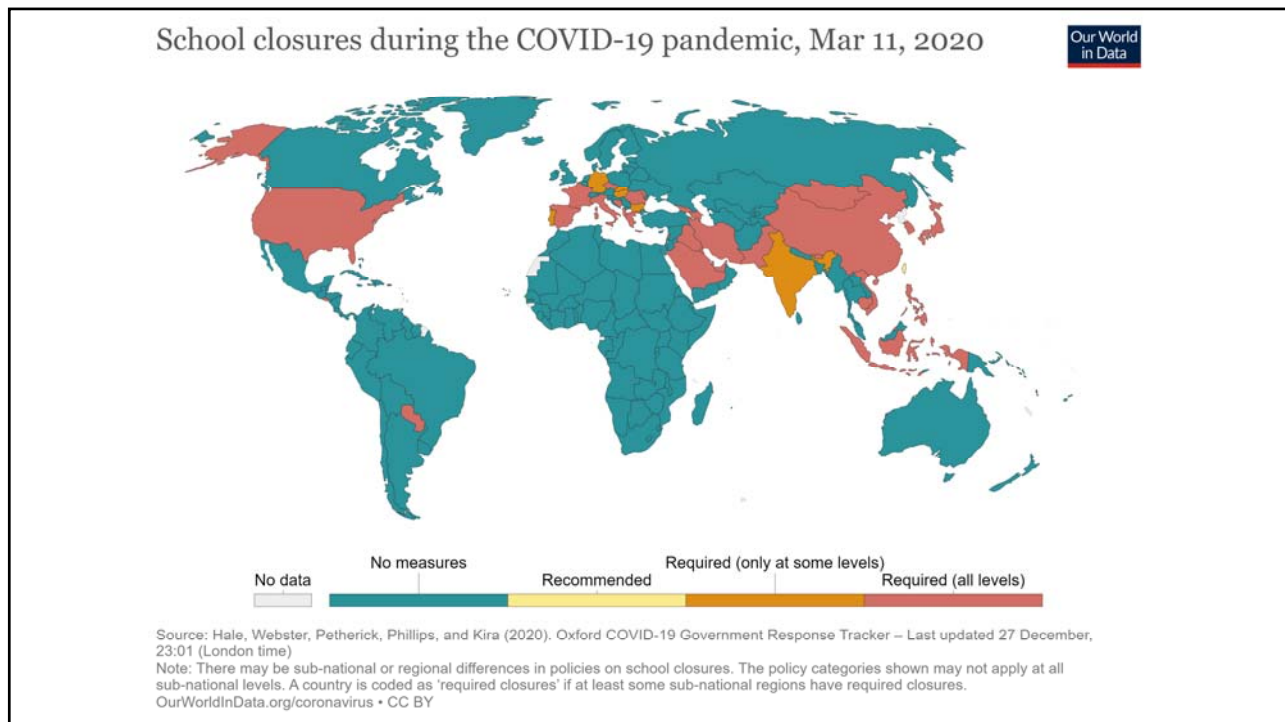
Our World in Data

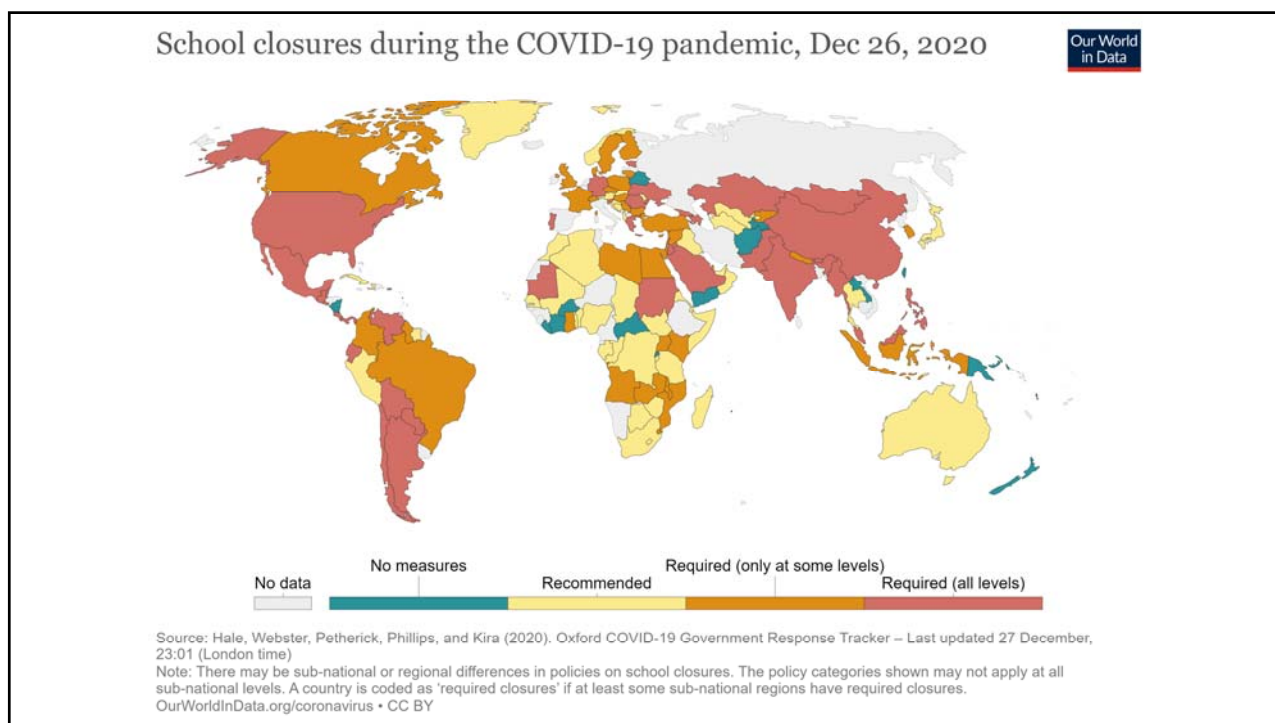
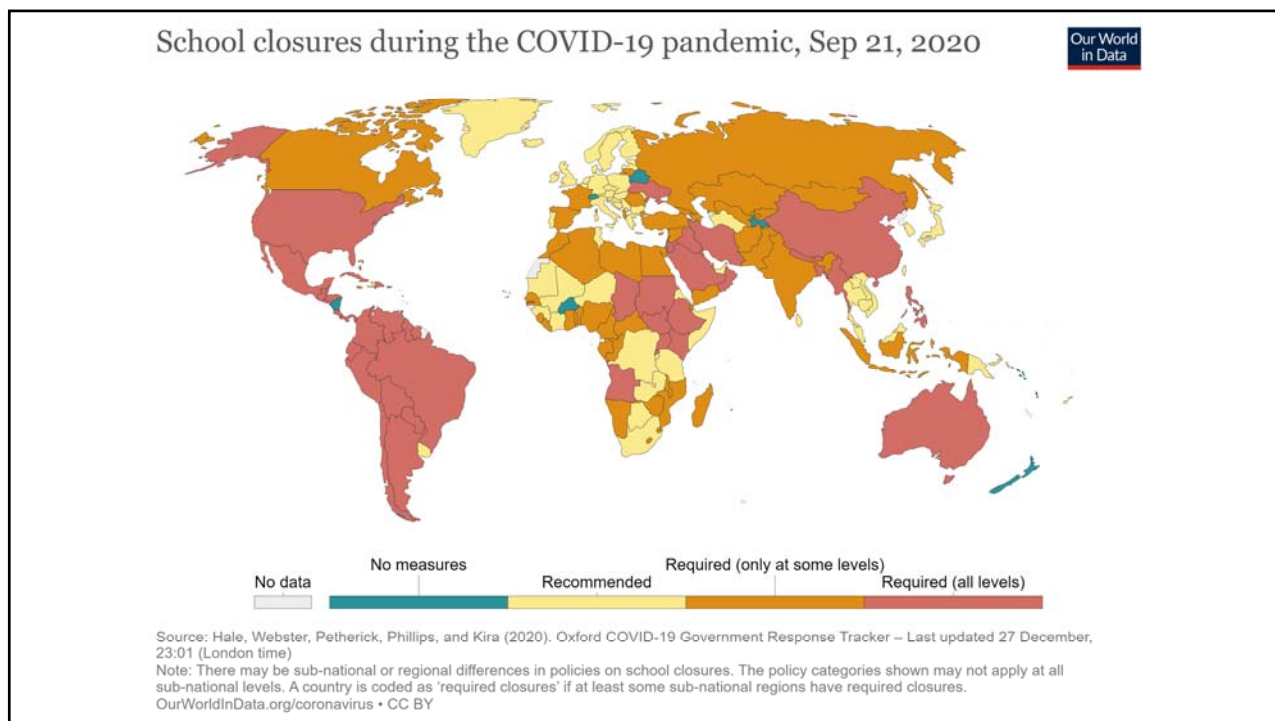


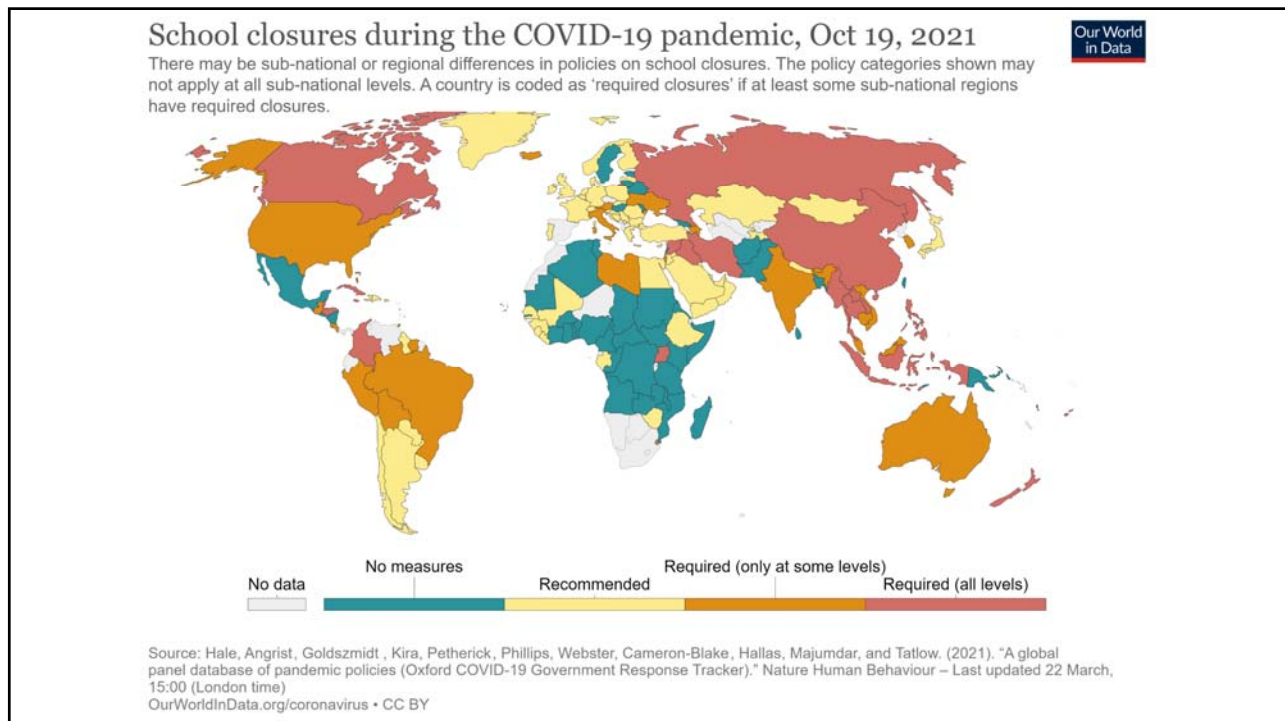
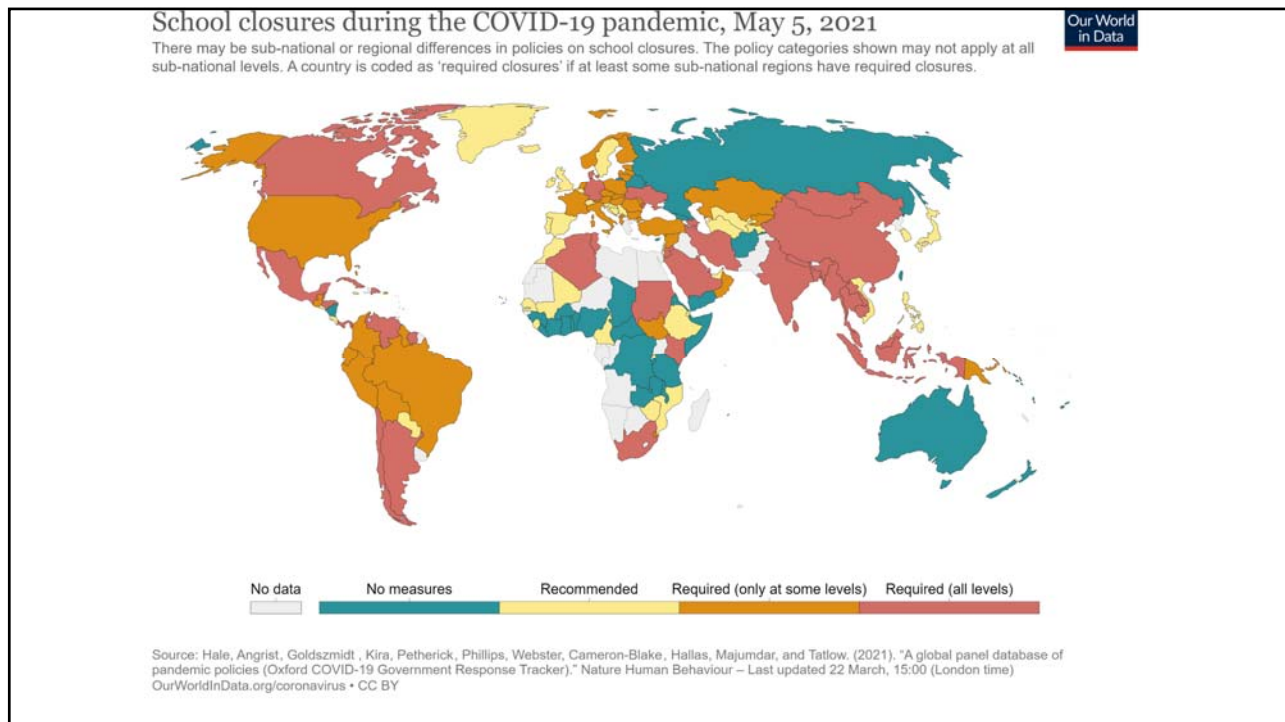
Source: Johns Hopkins University CSSE COVID-19 Data

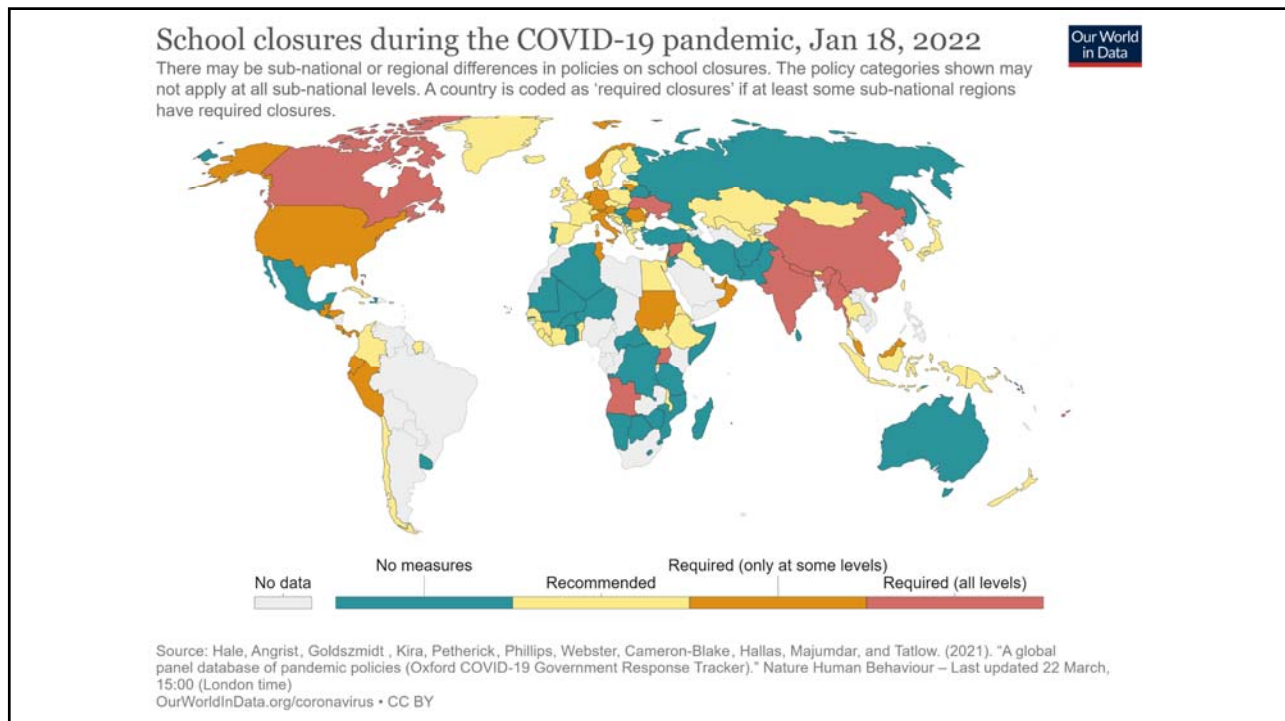
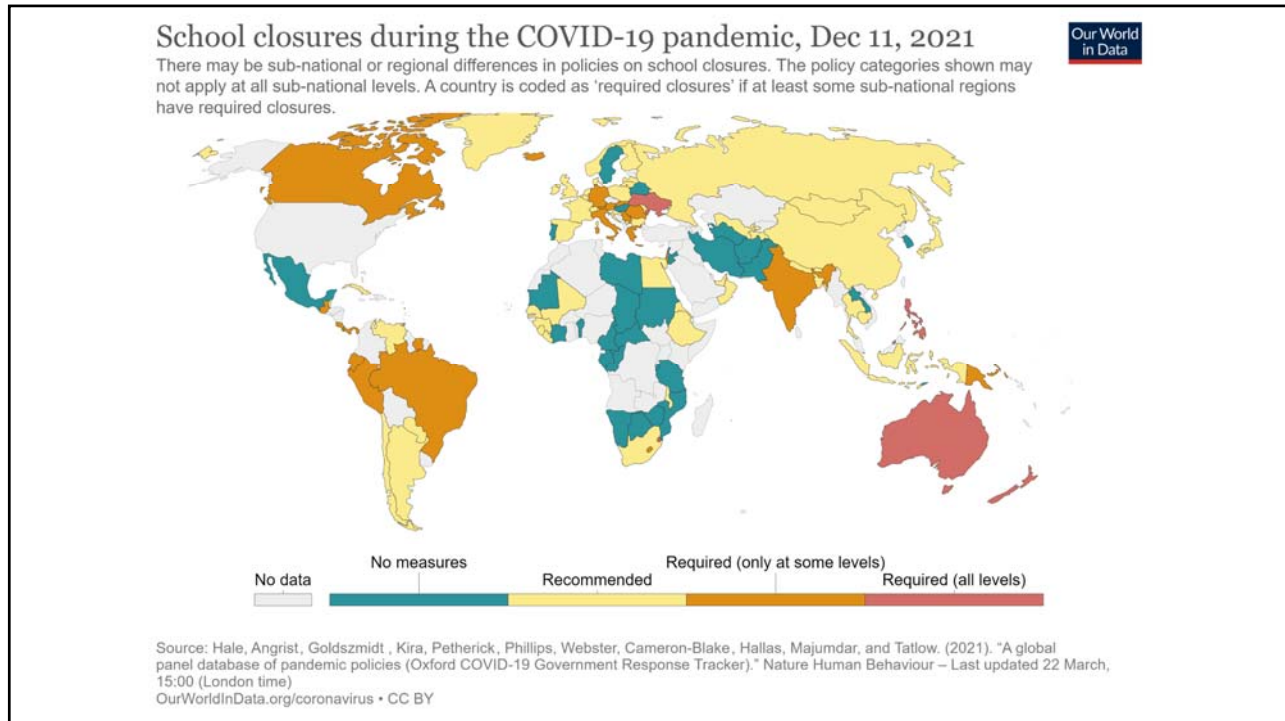
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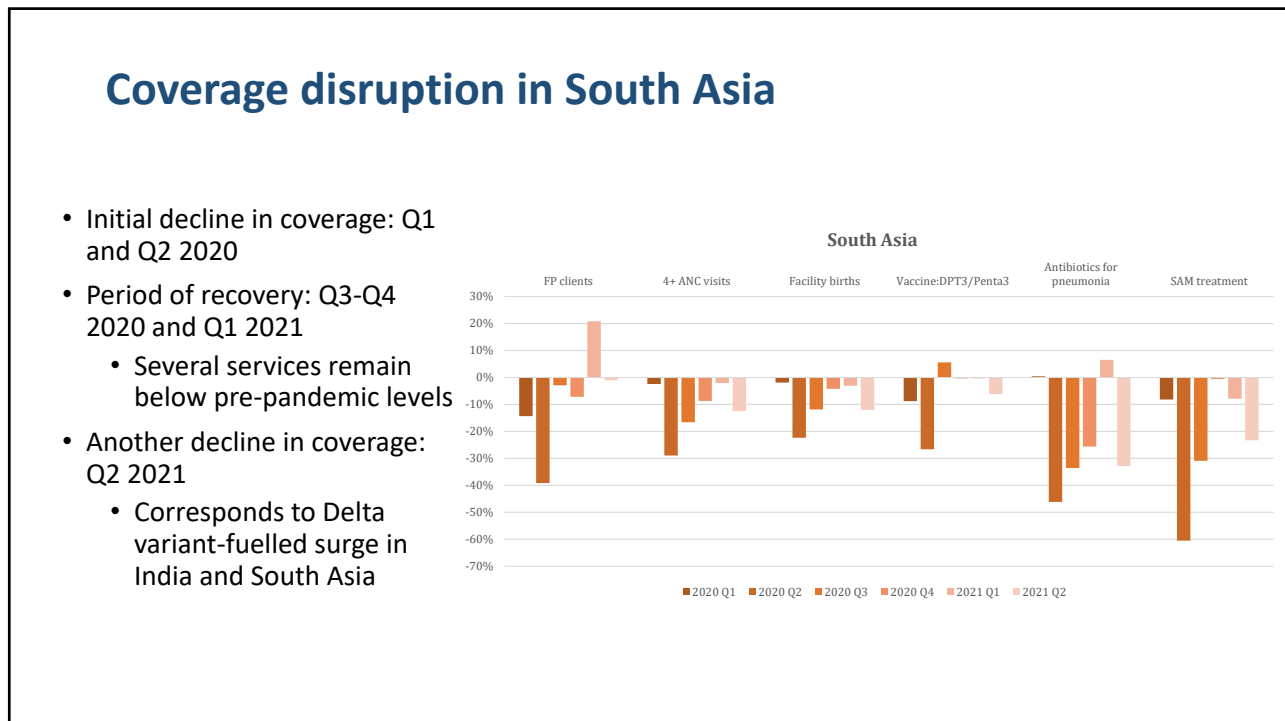
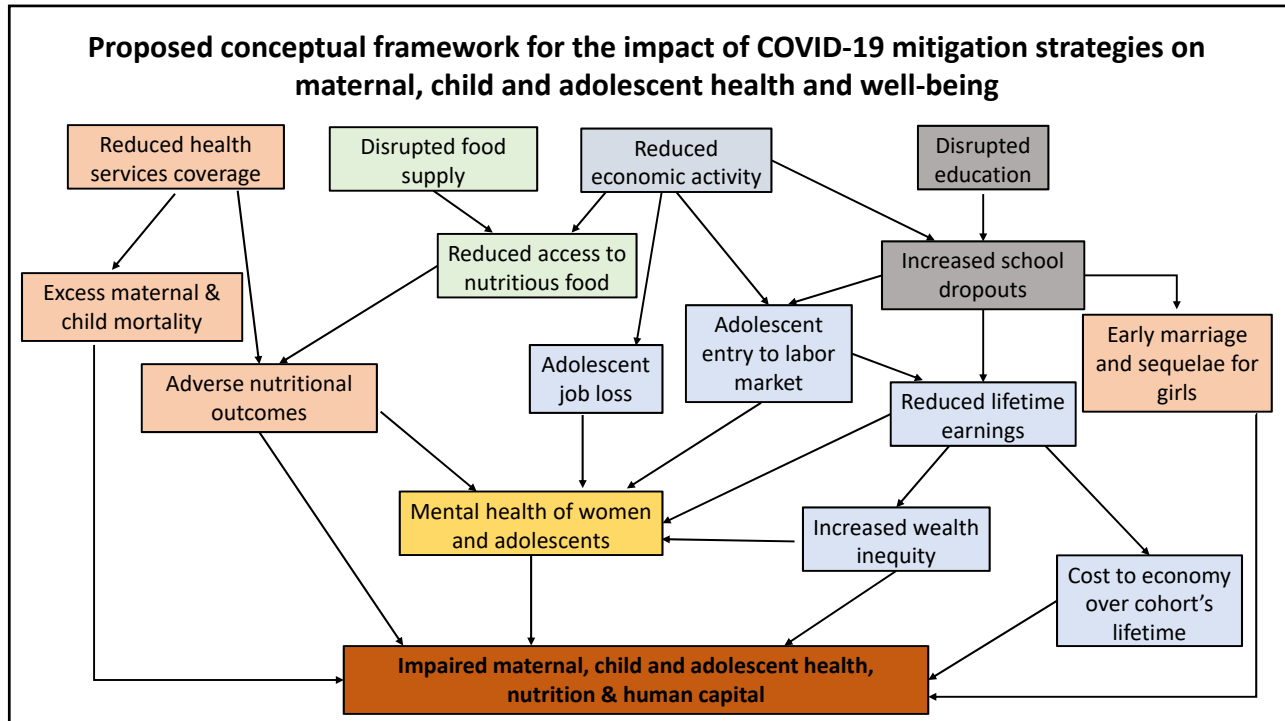












Impact on maternal and child mortality

- Child mortality (<59 months) → ~235,000 additional deaths = **↑10%**
 - ~150,000 have occurred in the neonatal period
- Stillbirths → ~103,000 = **↑8%**
- Maternal mortality → ~11000 additional deaths = **↑12%**
- > 4.5 million unintended pregnancies = **↑10%**

Impact on education

- Our focus: Loss in educational attainment due to increase in dropouts
- > 9 million children at risk of dropping out of school
 - > 3 million primary school-aged
 - > 6 million middle school-aged
- Increasing inequality in educational attainment, with >40% dropouts from poorest household
- Mean years of education lost = 7.3 years
 - → 20% decrease in lifetime earnings

Impact on girls

- > 4.5 million girls estimated to drop out of school
 - Many will be married off
- > 450,000 adolescent pregnancies → adverse birth and child health outcomes

Country	Adolescent pregnancies	Maternal deaths	Neonatal deaths	LBW	Stunted
Afghanistan	9,222	59	372	3,536	633
Bangladesh	107,331	186	1989	42,675	8,137
India	306,903	445	7694	117,667	21,995
Nepal	15,539	29	339	4,854	903
Pakistan	35,413	50	1621	13,577	2,391
Sri Lanka	2,179	1	9	495	97
Total	476,587	769	12024	182,804	34,156

COVID-19 and children

UNICEF March 2020

- Children are not the face of this pandemic. But they risk being among its biggest victims, as children's lives are nonetheless being changed in profound ways.
- All children, of all ages, and in all countries, are being affected, in particular by the socio-economic impacts and, in some cases, by mitigation measures that may inadvertently do more harm than good.
- This is a universal crisis, and for some children, the impact will be lifelong.
- Moreover, the harmful effects of this pandemic will not be distributed equally. They are expected to be most damaging for children in the poorest countries, and in the poorest neighborhoods, and for those in already disadvantaged or vulnerable situations.

Epidemiology of COVID-19 in children
My assessment to-date...

- The indirect effects of COVID-19 on lives of women and children may be much worse than direct effects
- Studies from communities/household clusters and educational settings show that younger children (<10 years) have a lower susceptibility to SARS-CoV-2 infection compared to adults, but a comparable risk of infection is observed in adolescents (10-19 years).
- Studies focusing on the effectiveness of mitigation measures in educational settings, including COVID-19 vaccination are urgently needed to support both public health and educational policy-makings, especially with omicron.
- And immunizations for children ... including school age children & adolescents are needed to fully protect children and get some semblance of normalcy!