

# CHILDREN: THE HIDDEN PANDEMIC

February 2022 Updated Interim Estimates



During the 6 months from May 1, 2021, through October 31, 2021, the emergence of the delta variant, along with new reports on excess mortality data, revealed rapid acceleration of COVID-19-associated orphanhood and caregiver deaths. This 6-month period followed the original 14-month period (March 1, 2020, through April 30, 2021) included in the full advisory report, 'Children: The Hidden Pandemic, 2021', found [here](#). Therefore, we describe trends in orphanhood and caregiver deaths in this brief summary that follows, 'Children: The Hidden Pandemic – Updated Interim Estimates, February 2022.' This update includes new global, regional, and national estimates for the numbers and characteristics of children affected by COVID-19-associated orphanhood and caregiver death as published in in the Lancet CAH on February 24, 2022.

The original full 2021 report found [here](#) provides an overview of lessons learned from the HIV/AIDS pandemic (Preface); a description of the global orphanhood and vulnerability problem in the context of COVID-19 (Introduction); global, regional, and national data for the first 14 months of the pandemic, referenced above (Toll of COVID-19 on Children); risks of adverse consequences of orphanhood and caregiver death for children (Enduring Impact on Children, Families, and Communities), and a framework for urgently needed solutions (A Strategy for Caring Action).

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## Acknowledgements

### **“Children: The Hidden Pandemic, February 2022”**

Updated Interim Estimates

Was prepared by the **Global Reference Group on Children Affected by COVID-19: Joint Estimates and Action**, and links to the Lancet CAH paper published Feb 24, 2022.<sup>1</sup>

**“Children: The Hidden Pandemic 2021 – A joint report of COVID-19-associated orphanhood and a strategy for action”**<sup>2</sup> reflects the contributions of technical experts from all core agencies contributing as co-authors to the linked report in the Lancet, “Global minimum estimates of children affected by COVID-19-associated orphanhood and deaths of caregivers: a modeling study.” (Published Online July 20, 2021. Available at [https://doi.org/10.1016/S0140-6736\(21\)01253-8](https://doi.org/10.1016/S0140-6736(21)01253-8))<sup>3</sup>, prepared by the **Global Reference Group on Children Affected by COVID-19: Joint Estimates and Action**. This group includes:

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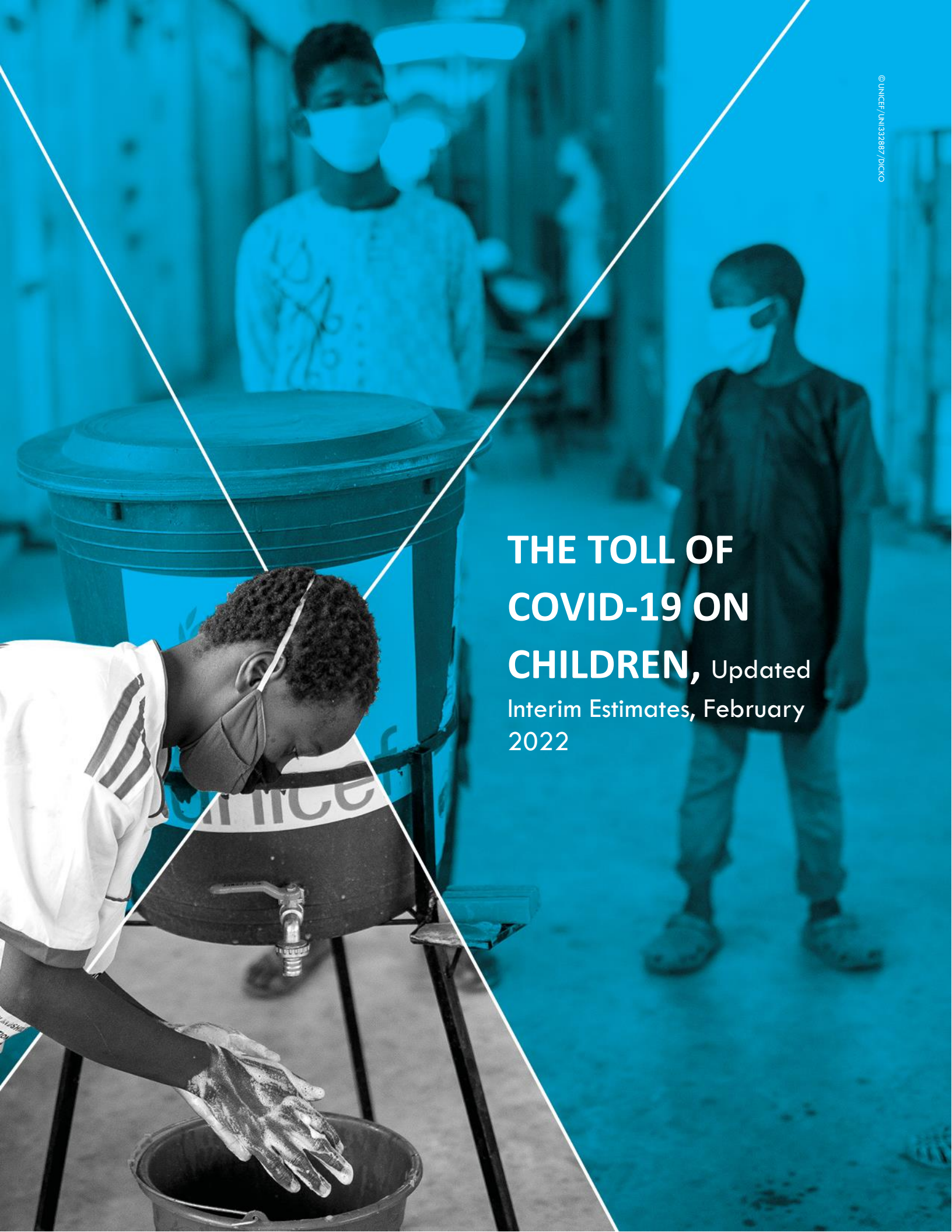
1. Imperial College London modelers who provided contributions to the analytics include Christl Donnelly, Oliver Ratmann, Samir Bhatt, Alexandra Blenkinsop
2. WHO inputs were provided by Alexander Butchart

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### Disclaimers

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# THE TOLL OF COVID-19 ON CHILDREN, Updated Interim Estimates, February 2022

## Estimating the Toll

This report updates our findings to provide the most current estimates of COVID-19 associated orphanhood and caregiver loss during the first 20 months of the pandemic (March 1, 2020 – October 31, 2021). We use the same methods as in the initial report but extend our analysis to consider the age of the child suffering orphanhood and their circumstance (lost a mother or a father)<sup>2</sup>. A description of our methods is found in Appendix II.

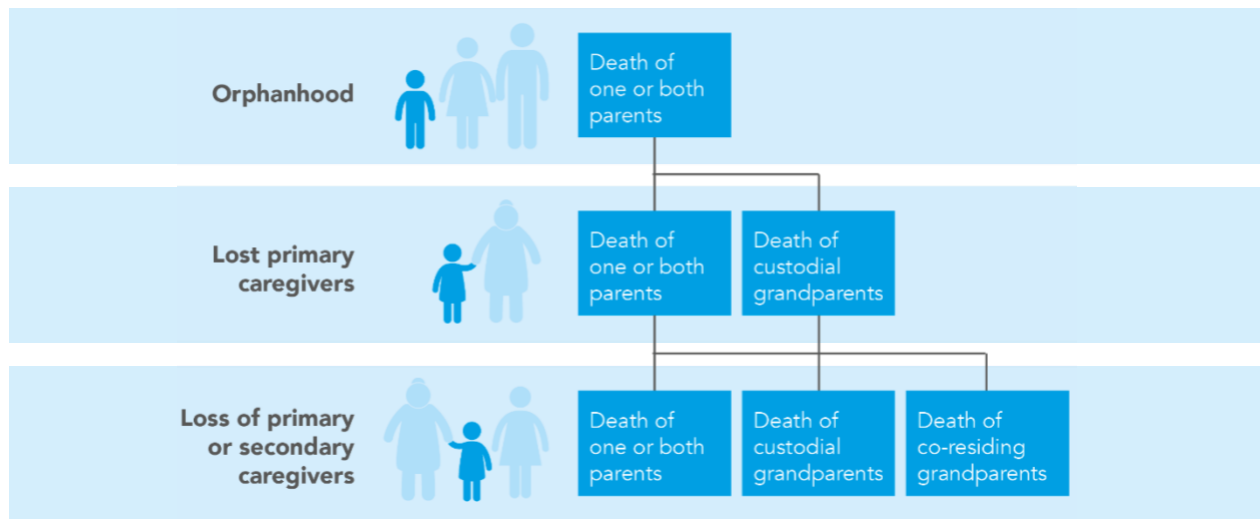
Our study set comprises 21 countries accounting for 76% of all COVID-19 deaths in 2020. Using data from these countries, we derive a global extrapolation for the total number of children experiencing COVID-19-associated death of a parent or grandparent caregiver. We use “COVID-19-associated deaths” to mean the total number of excess deaths caused directly by COVID-19 and those caused indirectly by causes linked to COVID-19, such as lockdowns, restrictions on gatherings and movement, decreased access or acceptability of health care and of treatment for chronic diseases. Where excess deaths were not routinely reported for a country, we calculated them by subtracting the monthly deaths in 2020/2021 from the monthly average during the five years before the pandemic. Where monthly data for 2020/2021 were not available, we used COVID-19 deaths as reported by Johns Hopkins University<sup>4</sup>.

To convey the scale of this caregiving crisis, and to maintain consistency with UNICEF’s definition, we define a child facing COVID-19-associated “orphanhood” as one under age 18 who has experienced the death of one or both parents. Our use of the term “orphanhood” is conscious and considered, encompassing our shared determination to rapidly advance urgently needed investments in support of family-based care, and to ensure every effort is made to avoid residential care, including orphanages other institutionalization of children.

Our inclusion of grandparents living with their grandchildren in multi-generational households arises from our determination to recognize those adult caregivers who are indispensable in caring for children. We include two categories of grandparents aged 60-84 years: 1) custodial grandparents living with their grandchildren in the absence of the parents (e.g., after parental death from AIDS or other causes, or as legal guardians for parents unable to care for children due to substance abuse, incarceration, migration for work); 2) other co-residing grandparents living with grandchildren and the parents of these children.

For the age and circumstance (paternal and maternal orphanhood) analyses, our study set comprises 20 countries and focuses on orphanhood only, due to limited data on characteristics of children living with grandparents. We estimate the age of each child orphaned and sex of the parent who died using female and male fertility and mortality data. We then fit a model using population composition to

estimate the proportion of children in each age category (0-4, 5-9 and 10-17) and circumstance of each child. Finally, we use the country specific number of orphans estimated using our previous methodology to estimate the number of



children in each of these categories from the proportions.

### The Magnitude of the Toll

We describe global, regional, and national results, as well as scenario estimates for COVID-19-associated deaths, orphanhood, and death of grandparent caregivers in this section. Specifically, we report findings for one or more of these three categories of children (See Diagram):

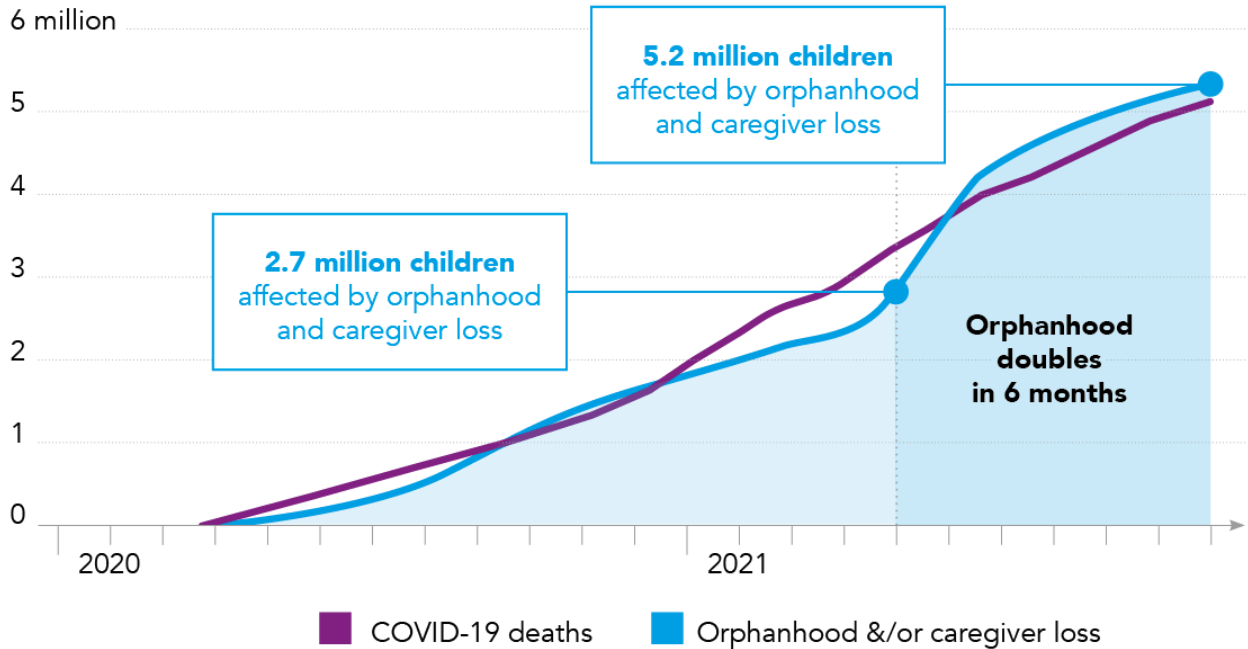
1. Children facing death(s) of one or both parents.
2. Children facing death of their primary caregivers (a parent and/or custodial grandparent).
3. Children facing death of their primary or secondary caregivers (a parent, custodial grandparent, and/or co-residing grandparent).

*Definitions of Orphanhood, Lost primary caregivers, and loss of primary or secondary caregivers*

1. [\*The Global Toll: By October 31, 2021, the number of children affected by COVID-19-associated orphanhood exceeded the number of reported COVID-19 deaths.\*](#)



The World Health Organization characterized COVID-19 a global pandemic in March 2020. During the next 14 months, from March 2020 through April 30, 2021, 3.3 million COVID-19 deaths occurred<sup>5</sup>. Compared to our initial report showing a minimum estimate of over 1.5 million children affected by COVID-19-associated death of parents and caregivers based on real-time mortality data for these first 14 months, the use of new excess mortality data showed this minimum estimate increased to over 2.7 million children (using back-calculations), as in Figure 1<sup>1</sup>.



We found surges in COVID-19-associated orphanhood and caregiver death over our 6-month interim update period (May 1, 2021 - October 31, 2021), with the total number of children affected by October 31, 2021 nearly double that occurring in the first 14 months of the pandemic (Figure 1). Globally, for every 1 reported COVID-19 death, at least 1 child experienced orphanhood or caregiver death. By October 31, 2021, 5.0 million COVID-19 deaths had occurred, and 5.2 million children had lost their mothers, their fathers, and/or their grandparent caregivers responsible for their needs and nurture.

**FIGURE 1:** Trends in COVID-19 deaths and children affected by orphanhood and death of caregivers, March 1, 2020 – October 31, 2021<sup>1</sup>.

The maps that follow show global distribution of COVID-19-associated orphanhood for 3 reporting periods: March 1, 2020 - April 30, 2021 (map 1, 14 months); March 1, 2020 – October 31, 2021 (map 2, 20 months)<sup>1</sup>, and March 1,

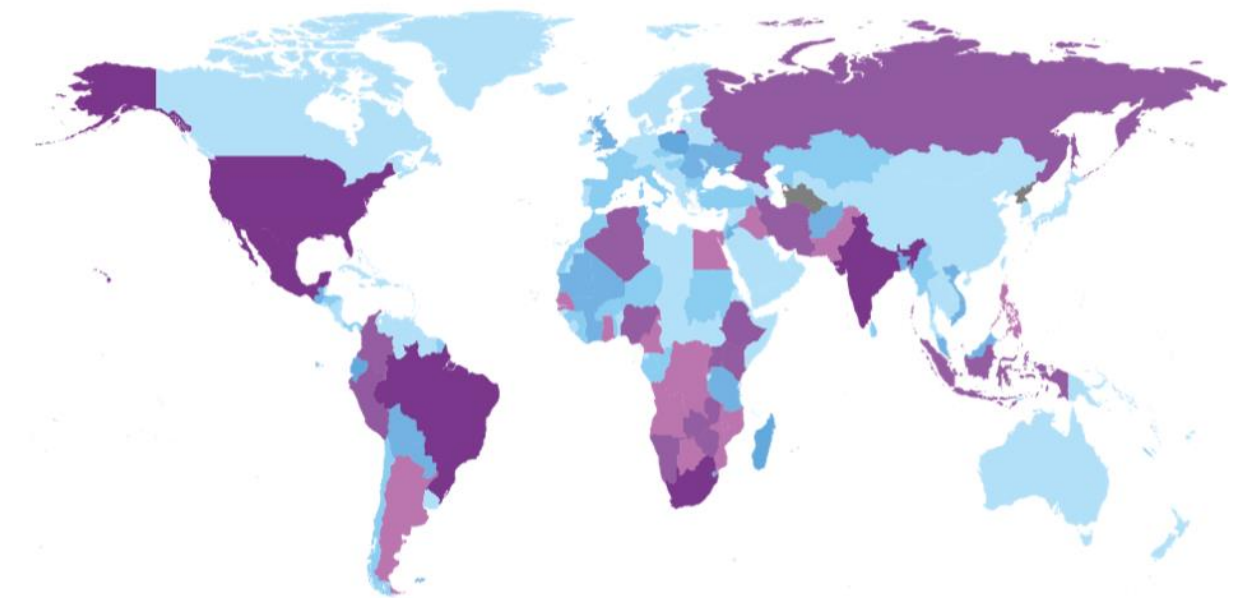
2020 –January 21, 2022 (map 3, 23 months)<sup>6</sup>. After completion of the minimum estimates for maps 1 and 2, new data from WHO on excess mortality became available citing death reporting in every global region, produced from WHO-led assessments in 133 countries<sup>7</sup>. Both the WHO EM site<sup>8</sup> and this full report, as well as multiple other references (including a systematic review from Nigeria<sup>9</sup> and an autopsy study from Zambia<sup>10</sup>) showed that death reporting in Africa is only 10% complete. Therefore, we adjusted all countries in the WHO Africa Region, except for South Africa, for the actual expected orphanhood rate that was 10 times higher than estimated using the best available data for our study period ending in October 2021. We show here both maps 1 and 2, as reported in the Lancet CAH through October 31, 2021<sup>1</sup>. We then extend these data forward using the Imperial real-time COVID-19 Orphanhood Calculator<sup>6</sup>. We found that based on the real time calculator, global estimates by January 21, 2022, had increased to 4.5 million children orphaned, 4.8 million children losing primary caregivers, and 6.7 million children losing primary and/or secondary caregivers by January 21, 2022. By this 23-month January 2022 update, covering nearly the first two years of the pandemic, the 32 high-burden countries where >25,000 children have experienced COVID-19 orphanhood and caregiver loss include India, Brazil, Mexico, South Africa, USA, Russian Federation, Ethiopia, Peru, Zimbabwe, I.R. of Iran, Kenya, Colombia, Zambia, Indonesia, Algeria, Uganda, Nigeria, Namibia, Malawi, Pakistan, Mozambique, Iraq, Senegal, Angola, Cameroon, Egypt, Argentina, Philippines, Rwanda, Botswana, Democratic Republic of Congo, and Ghana. Over half of these high-burden nations are in the Africa Region.

FIGURE 2: Global progression of distribution of COVID-19-associated orphanhood and caregiver deaths shown by April 30, 2020 (Map 1) and October 31, 2021 (Map 2), according to Lancet CAH report<sup>1</sup>, and updated in real-time through January 21, 2022 (Map 3), using Imperial Real-Time COVID-19 Orphanhood Calculator<sup>6</sup>.



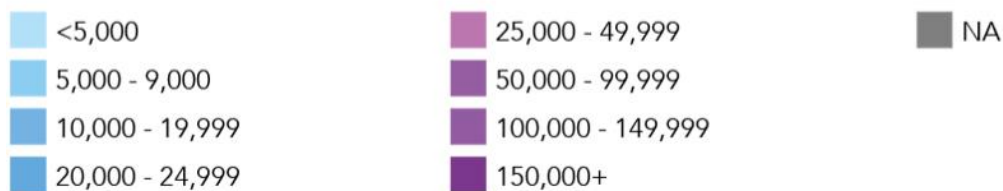
MAP 1, through Apr 2021

MAP 2, through Oct 2021



MAP 3, through Jan 2022

Primary and/or secondary caregiver loss



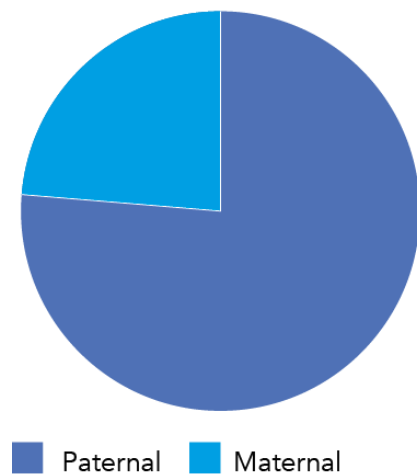
**Age-group and Family Circumstance for Children Affected by COVID-19-associated Orphanhood, Globally, March 1, 2020, through October 31, 2021**

Characteristics of children experiencing orphanhood differed globally in ways that are important for informing programs. First, 3 of every 4 children affected by orphanhood lost their fathers; and secondly, 2 of every 3 children affected by orphanhood were in the 10–17-year age-group. The numbers of children affected in every age group were disturbing. Nearly 500,000 children under age 5 years, over 735,000 children ages 5-9 years, and 2.1 million children ages 10-17 years were orphaned of their fathers and/or mothers in the first 20 months of the pandemic.

**FIGURE 3:** Percentages of orphanhood by age-group of children affected, and by maternal and paternal orphanhood, March 1, 2020, through October 31, 2021<sup>1</sup>

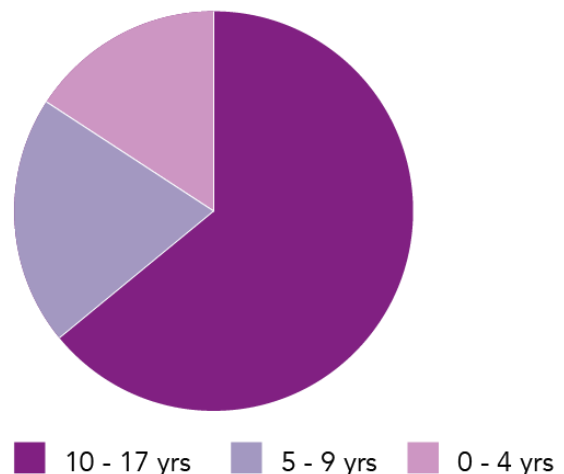
**Global distribution of paternal and maternal orphanhood**

Orphanhood by circumstance



**Global distribution of orphanhood by age-group at time of parental death**

Orphanhood by age group

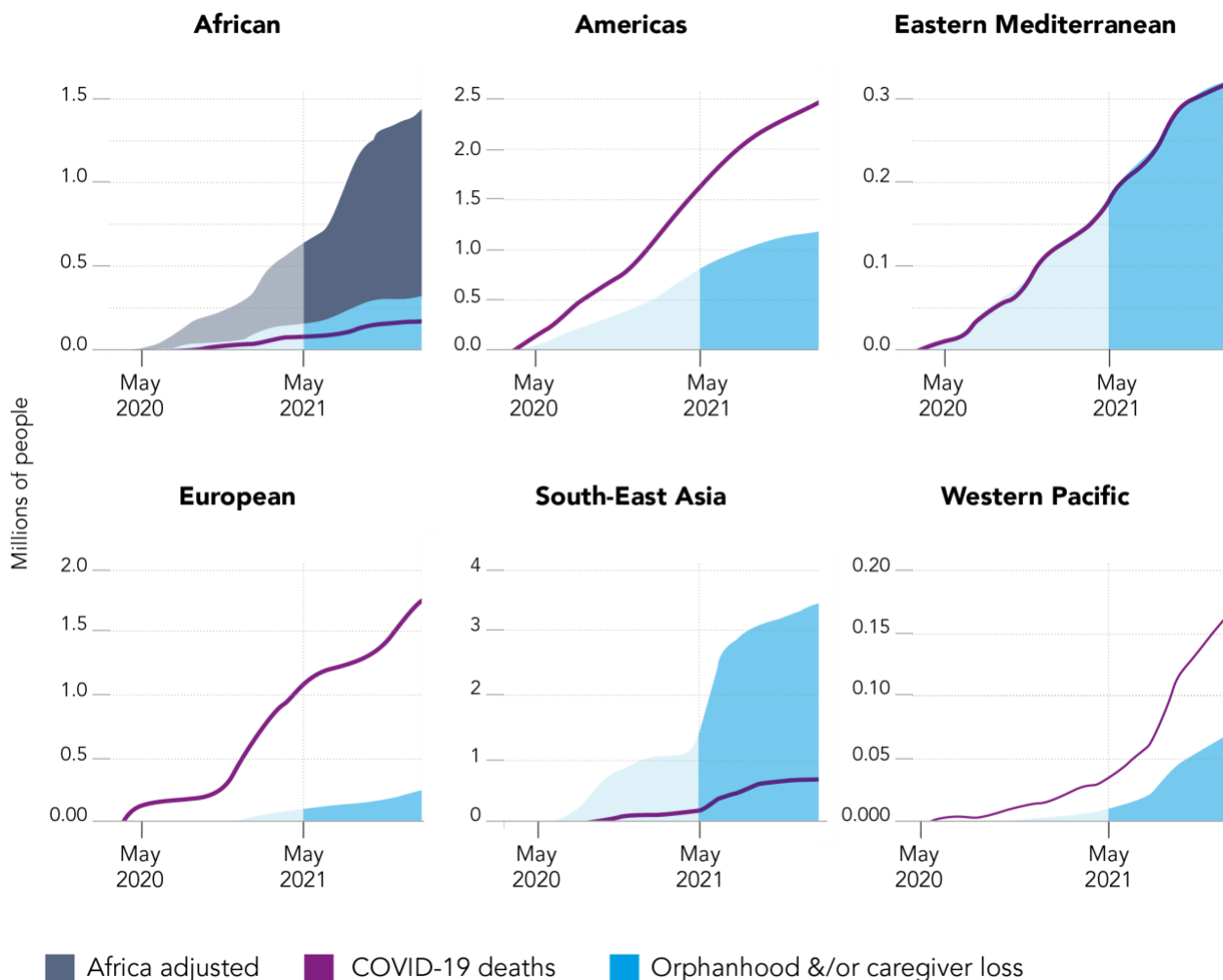


2. *The Regional Toll: The number of children experiencing death of a parent or other caregiver continues to increase in every region and exceeds the number of reported COVID-19 deaths in the three Regions.*

We found marked differences across regions in trends for the minimum number of children experiencing COVID-19-associated orphanhood or caregiver death during the 6-month interim update period (Figure 3). Orphanhood and caregiver death exceeded COVID-19 deaths for WHO African, Eastern Mediterranean, and South-East Asia Regions (Figure 3). Estimates of COVID-19 vaccine coverage for these three regions by September 9, 2021 showed that 4%, 21%, and 34%,

respectively, of the populations had received at least one dose; coverage was 53%, 56%, and 67%, respectively, for the European, Americas, and Western Pacific Regions.<sup>11</sup> Increases in COVID-19-associated caregiver deaths in 6 month study period was 47% in the Americas, 57% in the European, 59% in the Mediterranean, 76% in the African, 120% in South-east Asia, and 296% in the Western Pacific Region.<sup>1</sup>

FIGURE 4: Regional trends in minimum estimates of children who suffered orphanhood (death of one or more parents) or caregiver death (shaded blue area) and trends in reported COVID-19 deaths (purple line) from Johns Hopkins University through October 31, 2021<sup>1</sup>.



We report in Table 1 the total numbers of children experiencing orphanhood, primary caregiver death, and primary or secondary caregiver death during the first 20 months of the pandemic. Given limited availability of excess mortality for the African and Eastern Mediterranean Regions, it is likely that the numbers of children affected exceed the modeled minimum estimates shown here.

TABLE 1: Regional minimum estimates of children’s of loss of caregivers, March 1, 2020, through October 31, 2021<sup>1</sup>

Region	Minimum estimates of orphanhood	Minimum estimates of primary caregiver loss	Minimum estimates of primary and/or secondary caregiver loss
Africa	231,600	255,800	305,900
Americas	753,600	822,700	1,118,700
Eastern Mediterranean	244,900	256,300	304,600
Europe	114,700	134,900	224,100
South-East Asia	1,991,700	2,046,800	3,199,800
Western Pacific	34,200	37,800	55,900

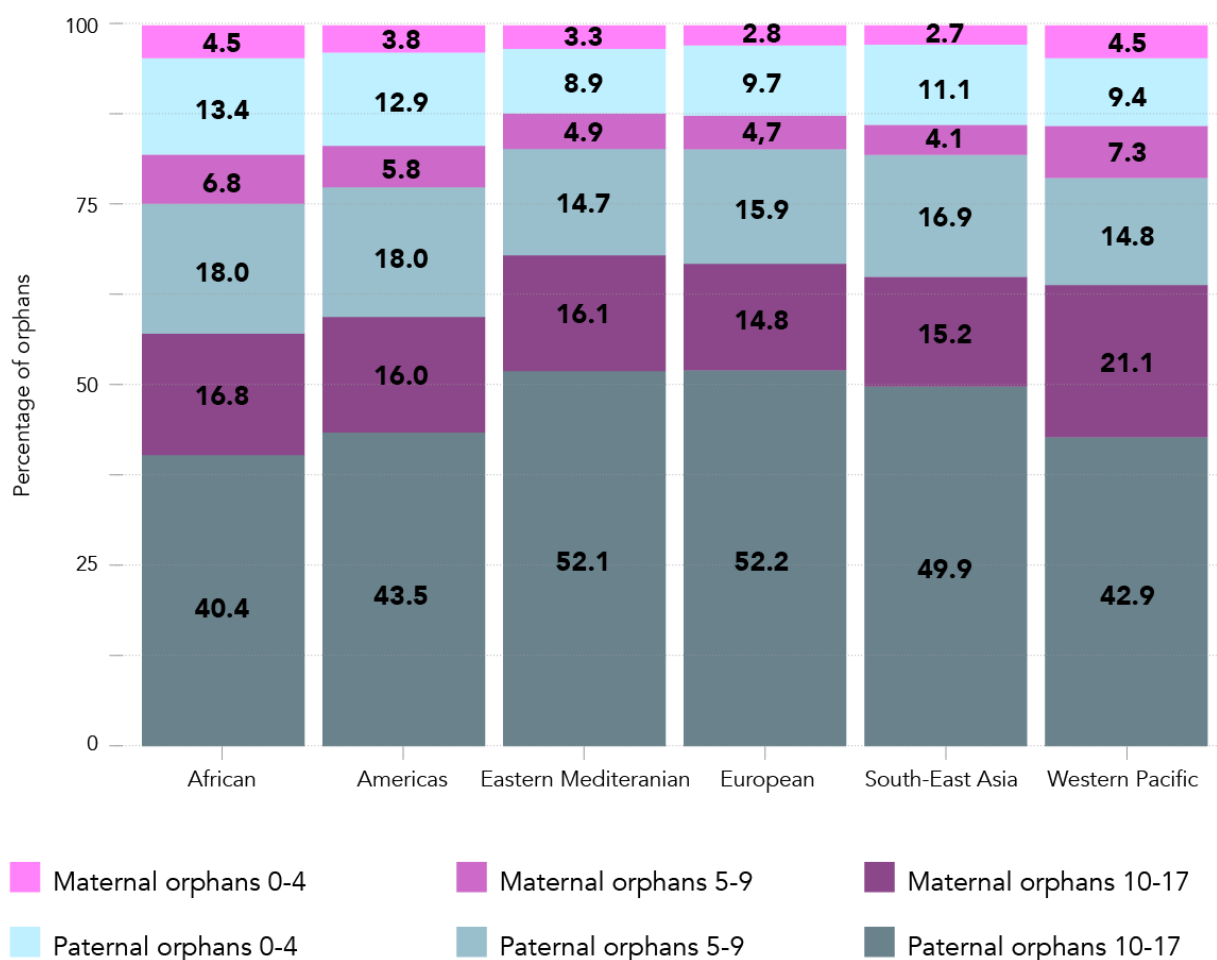
TABLE 2: Regional minimum estimates of children’s loss of caregivers, March 1, 2020, through January 15, 2022, based on Real-time Imperial COVID-19 Orphanhood Calculator<sup>6</sup>

Region	Minimum estimates of orphanhood	Minimum estimates of primary caregiver loss	Minimum estimates of primary and/or secondary caregiver loss
Africa	1,201,000	1,276,400	1,436,400
Americas	795,200	867,600	1,175,500
Eastern Mediterranean	260,000	272,200	323,100
Europe	139,800	165,900	279,700
South-East Asia	2,109,300	2,167,300	3,388,800
Western Pacific	42,600	46,900	69,000

### Age-group and Family Circumstance for Children Affected by COVID-19-associated Orphanhood, by Region, March 1, 2020 through October 31, 2021

Finally, we report regional distributions of age-group and circumstance for children affected by orphanhood. For every Region, we found that children of all ages were more likely to experience paternal orphanhood than maternal orphanhood (Figure 3). Furthermore, children experiencing orphanhood who were ages 10-17 ranged from 57.2% of affected children in the African Region, to 68.1% in the Eastern Mediterranean (Figure 5).

FIGURE 5: Regional percentages of maternal and paternal orphanhood in our three categories ages 0-4, 5-9, and 10-17 years, through October 31, 2021. The blue shades show composition of paternal orphans, whereas the purple shades show composition of maternal orphans<sup>1</sup>.



3. *The National Toll: Countries having the highest numbers of children facing loss of caregivers due to COVID-19 are distributed widely across global regions, and children affected by orphanhood are most likely to be adolescents whose fathers have died.*



We observed the largest burden of orphanhood and death of grandparent caregivers from March 1, 2020, through October 31, 2021 – the first 20 months of the pandemic -- in India, Mexico, Brazil, the USA, and South Africa (Fig 2).

### [National Trends Using Real-Time COVID-19 Orphanhood Calculator Widget](#)

We observed marked differences between countries in COVID-19-associated orphanhood or death of caregivers. These numbers can be found for any country in the world using the real-time COVID Calculator.

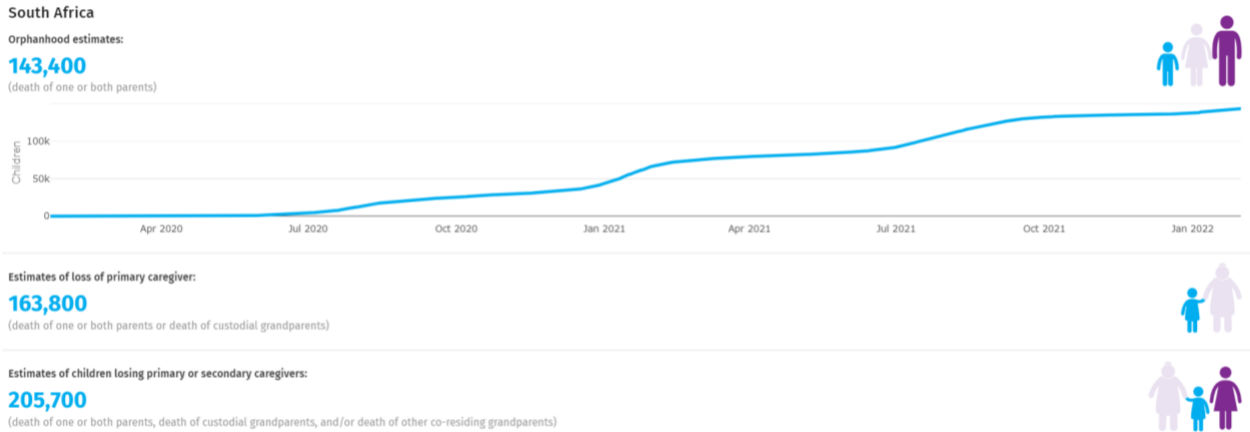
**For Imperial College's Country Calculator** giving up-to-date minimum estimates by country of minimum estimates of children affected by COVID-19 orphanhood and death of caregivers:

[https://imperialcollegelondon.github.io/orphanhood\\_calculator](https://imperialcollegelondon.github.io/orphanhood_calculator)

**For Imperial College's Interactive Visualization** enabling comparisons between countries and over time of minimum estimates of children affected by COVID-19 orphanhood and death of caregivers:

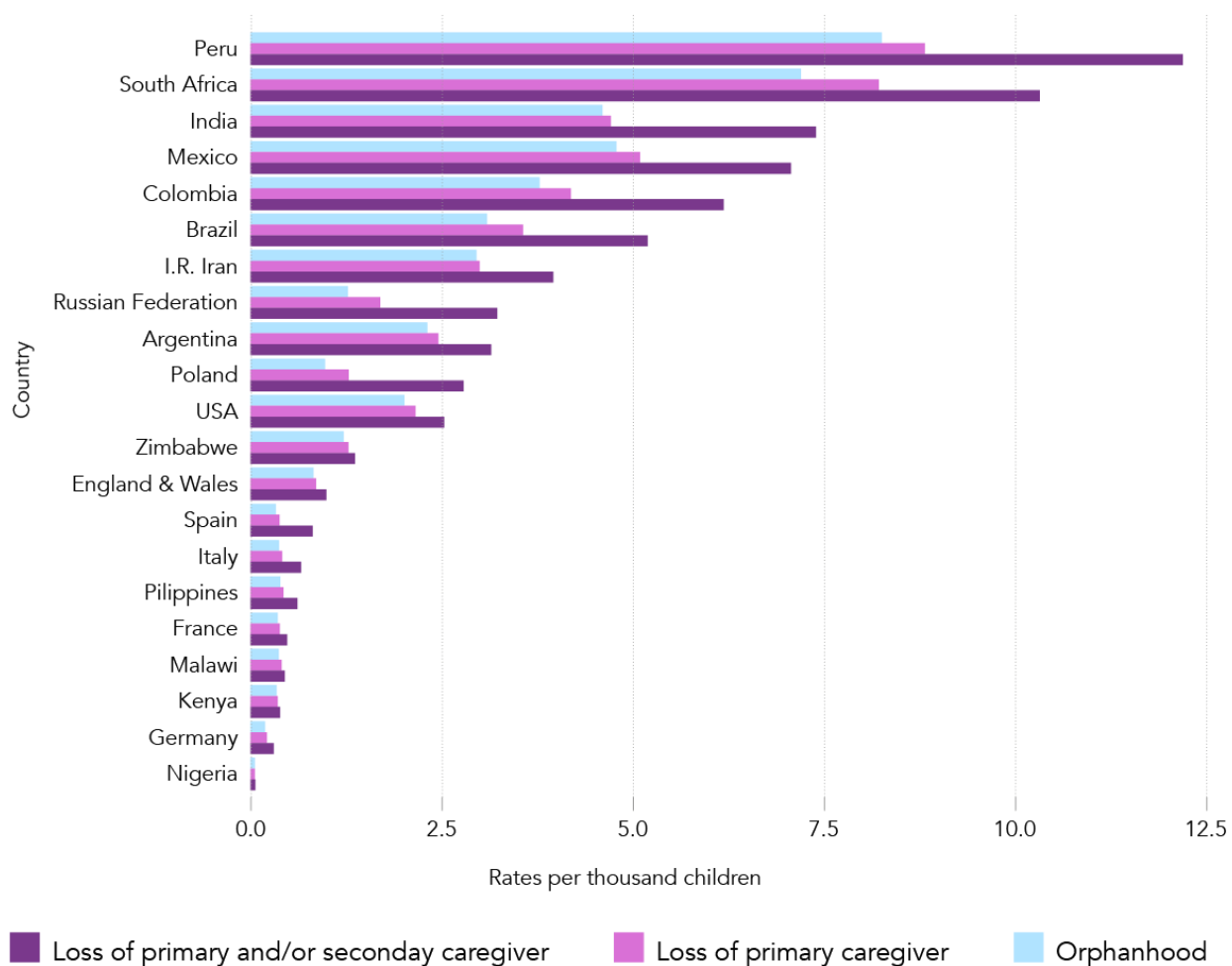
[https://imperialcollegelondon.github.io/orphanhood\\_trends](https://imperialcollegelondon.github.io/orphanhood_trends)

Figure 6: Real-time Imperial Orphanhood Calculator Data for Brazil, March 1, 2021, through January 31, 2022<sup>6</sup>.



Calculations of estimated orphanhood cases per 1,000 children showed highest rates in Peru, South Africa, Mexico, India, and Colombia (Figure 7)

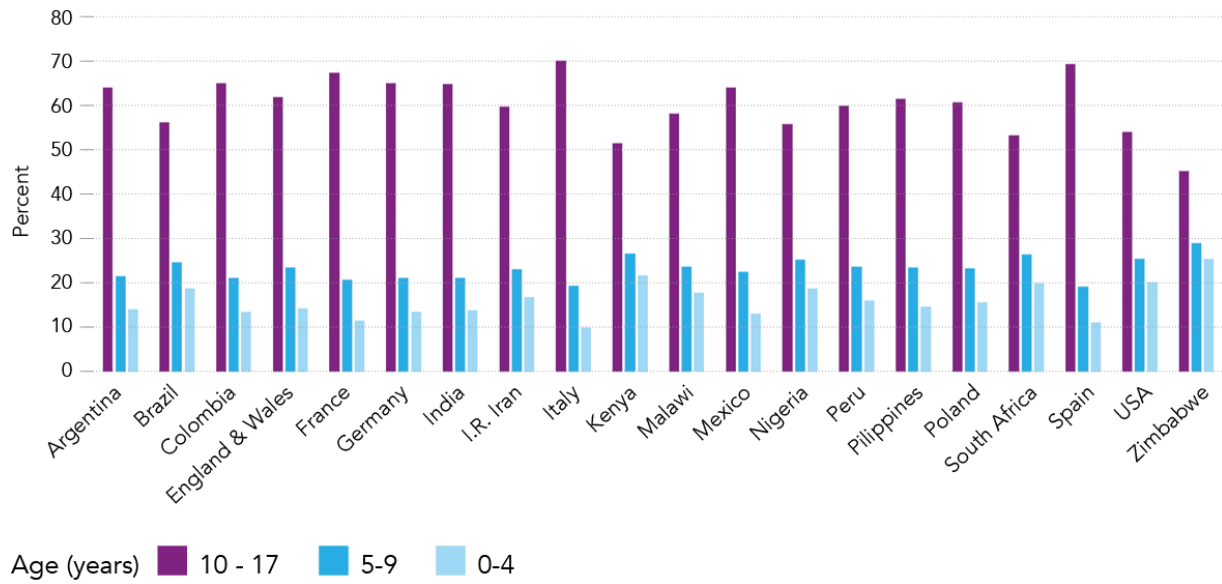
**FIGURE 7: National rates of COVID-19-associated orphanhood and caregiver death per 1,000 children, as of October 31, 2021<sup>1</sup>.**



**Age-group and Family Circumstance for Children Affected by COVID-19-associated Orphanhood in 20 Study Countries, March 1, 2020, through October 31, 2021<sup>1</sup>.**

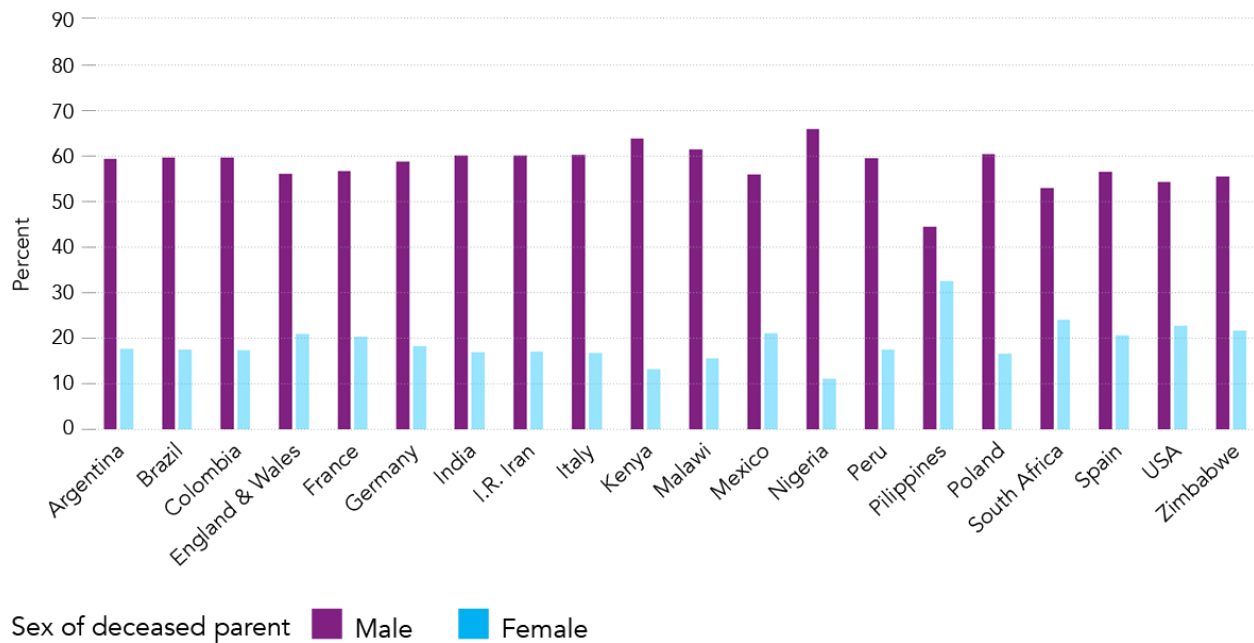
In each of the study countries, children who suffered orphanhood were most likely to be those ages 10-17 years and most likely to have faced the death of their fathers.

**Figure 8: Distribution of children affected by COVID-19-associated orphanhood according to age-group of the child at time of parental death<sup>1</sup>.**



Updated estimates from source :5.2 Million Children Affected by Global Surges in COVID-19-Associated Orphanhood and Caregiver Death (2022)  
 The Lancet CAH [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3971556](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3971556) [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3971556](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3971556)

Figure 9: Distribution of children affected by COVID-19-associated orphanhood according to paternal or maternal death in 20 study Countries, March 1, 2020, through October 31, 2021<sup>1</sup>.



\*BWIRE: Battle against violent extremism can be won (citizen.digital). Developmental Predictors of Violent Extremist Attitudes: A Test of General Strain Theory - Amy Nivette, Manuel Eisner, Denis Ribeaud, 2017 (sagepub.com).  
 Updated estimates from source :5.2 Million Children Affected by Global Surges in COVID-19-Associated Orphanhood and Caregiver Death (2022) The Lancet CAH [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3971556](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3971556) .  
[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3971556](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3971556)

4. Consideration of Scenarios for Planning Purposes: The number of children facing COVID-19-associated death of parents and caregivers will continue to rise for at least 5 years.

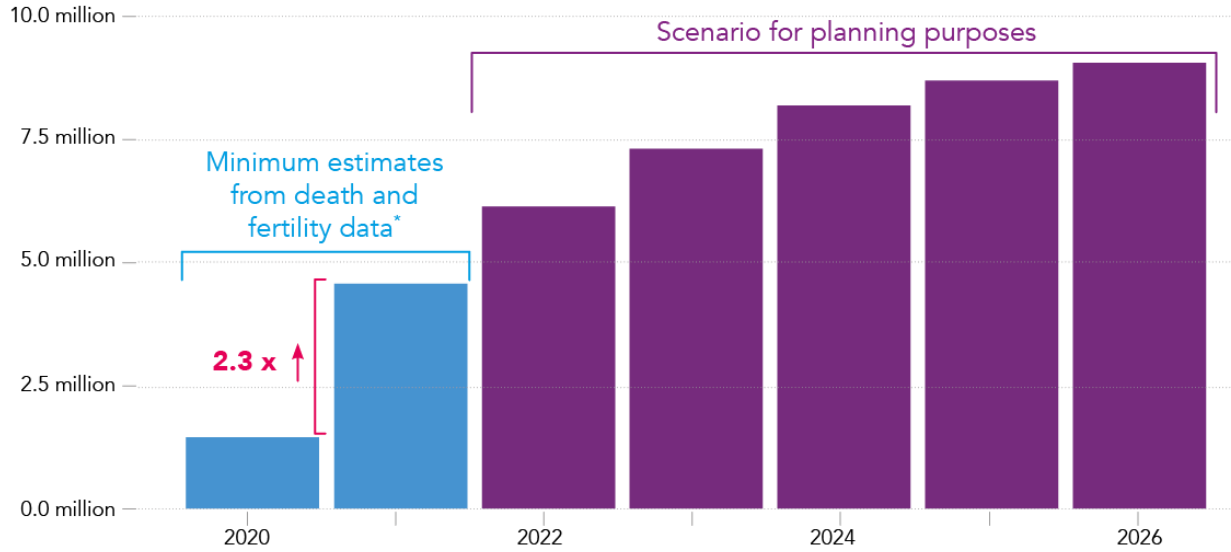
Estimates of future scenarios for death of parents and other caregivers are complicated by the increasing emergence of variants of concern, the potential for waning immunity among vaccinated populations, and the duration of time needed to reach herd immunity. Based on changes observed in COVID-19-associated orphanhood from 2020 through 2021, Imperial and Oxford modelers developed this following conservative scenario for planning purposes.

Given pandemic orphanhood and caregiver death increased 2.3 fold from 2020 to 2021, assumptions for 2022 to 2026 estimate a growth in the numbers of children affected by COVID-19-associated orphanhood and caregiver death from 2022 to 2026 as follows: 2022, average of number of children affected in 2020 and 2021; 2023, a 25% increase from 2022; 2024, a 15% increase from 2023; 2025, a 5% increase from 2024; and 2026, a 5% increase from 2025.

According to this scenario, there will be at least 9 million children orphaned by COVID-19 by 2026.

Figure 10: Scenario for Increases in Children Affected by COVID-19-associated Orphanhood, 2022-2026, for Planning Purposes

**Total COVID Orphans worldwide**



\*Updated estimates from source: 5.2 Million Children Affected by Global Surges in COVID-19-Associated Orphanhood and Caregiver Death (2022) The Lancet CAH. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3971556](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3971556); The true death toll of COVID-19: estimating global excess mortality (who.int) <https://www.cnn.com/2022/01/18/who-says-omicron-wont-be-last-covid-variant-as-global-cases-surge-by-20percent-in-a-week.html> [https://imperialcollegelondon.github.io/orphanhood\\_calculator/#/country/Global](https://imperialcollegelondon.github.io/orphanhood_calculator/#/country/Global)

## 5. *Monitoring the Toll*

Modeling provides an avenue for generating preliminary minimum estimates of the magnitude of COVID-19-associated orphanhood and death of caregivers, but what is most needed is to identify and care for the children behind the numbers. Thus, there is an immediate need to strengthen and scale up child-focused monitoring systems so governments and partners can provide a real-time response to children in need.

## 6. *Implications for Care*

The new data present a picture of an increasing and cumulative problem worldwide of COVID-19-associated orphanhood and vulnerability affecting children and youth. The pandemic has highlighted the cascading effects that health problems can have in families, societies, and economic systems. While the pandemic has come in several waves and may continue to affect populations with different levels of intensity, the second order effects it has on children will linger for years and merit urgent and comprehensive responses.

**Numbers matter – there were over 5.2 million children who lost a parent or caregiver to COVID-19 between March 2020 and October 31, 2021<sup>1</sup>. By January 15, 2022, the real-time Imperial calculator shows this minimum estimate increased to 6.7 million children<sup>6</sup>. And these are only minimum estimates. This surge in orphanhood adds to the 15 million children already orphaned by HIV/AIDS – identifying two overlapping sets of children and adolescents with shared needs and the potential to deliver shared services.**

The new data presented here further expand information on distribution by which age groups of children are affected by parent and caregiver death, which types of caregiver deaths are predominant globally, and the differential impacts between regions and nations. Together, these new data provide key insights into three essential considerations for tailoring policies to children's loss circumstances: location, age, and gender<sup>1</sup>. We describe these below.

**First, location matters – the countries and communities facing surges in orphanhood are often among the least well prepared to address them.** The surge in orphanhood has been especially pronounced in countries with younger demographic profiles—countries that are often poorer with fewer support systems in place for affected children. Increases in COVID-19-associated caregiver deaths in the 6 months from May 1-October 31, 2021, ranged from 43% in the Americas to 296% in the Western Pacific Region. Increases in other regions were 55% in Europe, 61% in Eastern Mediterranean, 80% in Africa, and 119% in South and East Asia. Over 60% of children orphaned in this most recent

6-month period live in South and East Asia, potentially due to recent devastating surges in India and newly reported excess mortality. The ratio of children orphaned to COVID-19-associated deaths is now close to 2 children for every one death in Zimbabwe, Malawi, Nigeria, and Kenya. These numbers underestimate the actual toll, especially in countries in Africa where, as shown, only 10% of deaths are reported<sup>7</sup>.

**Second, age matters -- each stage of a child's development calls for tailored support in the face of orphanhood.** We classified children into age-groups, based on differing needs, risks, and response strategies: ages 0-4, 5-9, and 10-17 years. Orphanhood is an adverse experience for a child of any age as they face grief, disruptions in care, and vulnerabilities associated with family disintegration. Parental loss also increases risks of institutionalization at any age, with negative consequences for development, socialization, and wellbeing. However, the specific impacts of orphanhood – and the corollary program and policy responses – vary with age. Children in their early years need continued investments in nurturing care, including health and nutrition, cognitive stimulation, and protection from stress. Disruptions in these core investments put their development at risk, including longer-term health, education, income, and stability. School-age children face the added challenge of staying enrolled and focused on learning – elements put under great strain by COVID-19-associated school closures and the poverty caused by deaths of adults in the family.

**Adolescent children are the largest group impacted, accounting for 2 out of every 3 children facing orphanhood.** Orphanhood can put adolescents at risk of sexual violence, exploitation, HIV, suicide, and dropping out of school, often to work or care for younger siblings. Support for adolescent children needs to consider these risk factors, as well as the protective factors provided by support from the surviving parent or other engaged adults to help adolescents manage the family loss and move towards independence with confidence and resilience.

**Third, mothers, fathers, and grandparents all matter -- children are more likely to have had a father die than a mother, as 3 of every 4 children affected by orphanhood lost their fathers.** To date, COVID-19-induced mortality has been disproportionately focused on men. The higher incidence of mortality among men leaves many families struggling with not only the burden of losing a family member, but also massive financial shock, especially in contexts where men are typically the primary income earners. The growing toll of orphanhood and of paternal deaths is particularly challenging in countries where safety nets and social insurance remain limited and where women still face lower earnings and more precarious employment. Individuals and households facing orphanhood without access to social protection are often forced to adopt risk management strategies that introduce new risks. These include child marriage, transactional sex, and leaving school to work or care for siblings. These negative coping strategies often differ between girls and boys as well as surviving mothers and fathers.



**The gender of the orphan is also important**, especially for adolescents, where orphanhood is concentrated. Adolescent females affected by orphanhood, compared to males, have decreased school enrolment, and greater risks of sexual violence and exploitation, child marriage, and dropping out of school. Adolescent males can also be forced to drop out of school to work or help with childcare and can be at risk of exploitation from violent groups such as gangs and militias. Evidence shows that parental monitoring reduces such risks, and that the active engagement of caring adults can provide protection. Building parenting skills for remaining caregivers and life skills for adolescents can promote recovery by strengthening self-esteem and peer relationships.

**These updated estimates and new data on the age and circumstances of children affected underscore the urgent need for a response tailored to affected countries and populations.** The *Global Reference Group on Children Affected by COVID-19: Joint Estimates and Action* focuses on the empirical, as well as the program and policy recommendations, surrounding this crisis. These are outlined in 'Children: The Hidden Pandemic, 2021'<sup>2</sup>, a 3-pronged strategy to guide responses by policymakers, development institutions, and civil society organizations: *Preventing* death of caregivers, *Preparing* families and caregivers to provide safe and nurturing family-based support, and *Protecting* children using evidence-based strategies that address their risks of poverty, childhood adversity and violence, and strengthen their recovery by providing promising 'cash plus care' models that combine income transfers with caregiver support.

The implementation of evidence-based responses to the COVID-19 pandemic at local, national, and global levels is consequently urgently needed within an approach that addresses first-order and second-order effects of the disease in the short-, medium-, and long-term. Such comprehensive responses within national response plans for COVID-19 could include equitable vaccine access combined with evidence-based programs for bereaved children and adapted to different geographies, cultures, and age groups with gender-sensitive approaches.

**Conclusions:** As this changing pandemic progresses with new variants, shifting surges, and continued vaccine disparities, an adequate response for children will depend on using the best available data to characterize COVID-19-associated orphanhood and caregiver death. First, current data on changes over time across regions and nations will help prioritize a response. Second, data on rates of orphanhood by age-group and circumstances of maternal/paternal orphanhood are required to deliver developmentally appropriate effective interventions. Third, an understanding by region and nation of burden and surges in orphanhood and caregiver death will help governments and development partners focus investments on children at greatest risk, in locations most affected.

## Appendix 1A

Estimates by Country for COVID-19-associated  
Orphanhood and Death among Caregivers, March 1, 2020, through  
October 31 2021, based on The Lancet CAH<sup>1</sup>

Country	Minimum estimates of orphanhood [95% Credible Intervals]	Minimum estimates of primary caregiver loss [95% Credible Intervals]	Minimum estimates of primary and/or secondary caregiver loss [95% Credible Intervals]	Country	Minimum estimates of orphanhood [95% Credible Intervals]	Minimum estimates of primary caregiver loss [95% Credible Intervals]	Minimum estimates of primary and/or secondary caregiver loss [95% Credible Intervals]
<b>Africa</b>				Kenya*	8400	8700	9400
Algeria	6100 [4200 - 7800]	6500 [4600 - 8200]	7300 [5500 - 8900]	Lesotho	820 [600 - 1000]	860 [600 - 1100]	940 [700 - 1200]
Angola	3100 [3100 - 3200]	3300 [3200 - 3300]	3700 [3600 - 3800]	Liberia	510 [400 - 600]	540 [500 - 600]	590 [500 - 700]
Benin	290 [200 - 300]	310 [300 - 400]	340 [300 - 400]	Madagascar	1700 [1600 - 1800]	1800 [1700 - 1900]	1900 [1800 - 2100]
Botswana	2200 [1500 - 2900]	2300 [1600 - 3100]	2700 [2000 - 3400]	Malawi*	3500	3800	4200
Burkina Faso	390 [300 - 400]	410 [400 - 500]	460 [400 - 500]	Mali	1000 [1000 - 1100]	1100 [1000 - 1100]	1200 [1200 - 1300]
Burundi	69 [0 - 100]	73 [0 - 100]	82 [0 - 100]	Mauritania	1400 [1400 - 1500]	1500 [1400 - 1600]	1700 [1600 - 1800]
Cabo Verde	120 [0 - 300]	130 [0 - 300]	180 [100 - 300]	Mauritius	**	**	**
Cameroon	3000 [3000 - 3100]	3200 [3100 - 3300]	3600 [3500 - 3700]	Mozambique	3500 [3400 - 3600]	3700 [3600 - 3700]	4100 [4000 - 4200]
Central African Republic	180 [100 - 200]	190 [100 - 200]	210 [200 - 300]	Namibia	5100 [4200 - 5800]	5400 [4500 - 6100]	5800 [4900 - 6500]
Chad	320 [300 - 400]	330 [300 - 400]	380 [300 - 400]	Niger	390 [300 - 400]	410 [400 - 500]	460 [400 - 500]
Comoros	260 [200 - 300]	270 [200 - 300]	300 [200 - 400]	Nigeria*	5600	5700	6400
Congo	460 [400 - 500]	490 [400 - 500]	540 [500 - 600]	Rwanda	2300 [2100 - 2400]	2400 [2200 - 2500]	2600 [2400 - 2800]
Cote d'Ivoire	1300 [1200 - 1300]	1300 [1300 - 1400]	1500 [1400 - 1500]	Sao Tome and Principe	100 [0 - 200]	110 [100 - 200]	120 [100 - 200]
Democratic Republic of the Congo	2000 [1900 - 2000]	2100 [2000 - 2100]	2400 [2300 - 2400]	Senegal	3400 [3300 - 3500]	3600 [3500 - 3600]	4000 [3900 - 4100]
Equatorial Guinea	300 [200 - 400]	310 [300 - 400]	350 [300 - 400]	Seychelles	60 [0 - 100]	65 [0 - 200]	84 [0 - 200]
Eritrea	78 [0 - 100]	82 [0 - 100]	90 [0 - 100]	Sierra Leone	210 [200 - 300]	220 [200 - 300]	240 [200 - 300]
Eswatini	1300 [900 - 1700]	1400 [1000 - 1800]	1500 [1100 - 2000]	South Africa*	134500	153600	192900
Ethiopia	11000 [10800 - 11600]	12000 [11400 - 12200]	13000 [12400 - 13500]	South Sudan	240 [200 - 300]	250 [200 - 300]	280 [200 - 300]

Gabon	410 [300 - 500]	430 [400 - 500]	470 [400 - 500]	Togo	430 [400 - 500]	450 [400 - 500]	500 [400 - 600]
Gambia (Republic of The)	620 [600 - 700]	650 [600 - 700]	730 [700 - 800]	Uganda	5800 [5700 - 5900]	6100 [6000 - 6200]	6800 [6700 - 7000]
Ghana	2000 [1800 - 2100]	2100 [1900 - 2200]	2300 [2100 - 2400]	United Republic of Tanzania	1300 [1300 - 1400]	1400 [1300 - 1400]	1600 [1500 - 1600]
Guinea	700 [600 - 700]	730 [700 - 800]	820 [800 - 900]	Zambia	6600 [6500 - 6700]	7000 [6800 - 7000]	7800 [7600 - 7900]
Guinea Bissau	250 [200 - 300]	270 [200 - 300]	300 [200 - 400]	Zimbabwe*	8000	8400	8900
Country	Minimum estimates of orphanhood	Minimum estimates of primary caregiver loss	Minimum estimates of primary and/or secondary caregiver loss	Country	Minimum estimates of orphanhood	Minimum estimates of primary caregiver loss	Minimum estimates of primary and/or secondary caregiver loss
<b>Americas</b>				Jamaica	430 [200 - 800]	480 [200 - 900]	780 [400 - 1300]
Antigua and Barbuda	**	**	38 [0 - 100]	Mexico*	192500	205000	284400
Argentina*	30300	32100	41200	Nicaragua	92 [0 - 200]	100 [0 - 200]	130 [0 - 200]
Bahamas	74 [0 - 200]	83 [0 - 200]	150 [0 - 300]	Panama	3900 [2200 - 5900]	4200 [2400 - 6300]	5400 [3600 - 7400]
Barbados	**	**	31 [0 - 100]	Paraguay	8000 [4700 - 12300]	8700 [5100 - 13200]	11000 [7600 - 15700]
Belize	180 [100 - 400]	200 [100 - 400]	280 [100 - 500]	Peru*	80200	85700	118500
Bolivia (Plurinational State of)	15000 [9300 - 20000]	16000 [10100 - 21300]	19000 [13300 - 23700]	Saint Kitts and Nevis	**	**	**
Brazil*	169900	195800	285500	Saint Lucia	**	**	**
Canada	1900 [900 - 3500]	2100 [1000 - 3900]	4300 [2500 - 7000]	Saint Vincent and the Grenadines	**	**	**
Chile	3300 [1600 - 6500]	3700 [1900 - 7200]	7100 [4200 - 11900]	Suriname	520 [200 - 900]	570 [300 - 900]	750 [400 - 1100]
Colombia*	55300	61300	90500	Trinidad and Tobago	180 [0 - 400]	200 [0 - 400]	370 [200 - 600]
Costa Rica	750 [300 - 1400]	840 [400 - 1500]	1600 [900 - 2500]	Uruguay	1200 [600 - 2100]	1300 [600 - 2300]	2100 [1200 - 3300]
Cuba	660 [300 - 1300]	750 [300 - 1400]	1500 [800 - 2400]	USA*	149300	160000	187800
Dominica	**	**	**	Venezuela (Bolivarian Republic of)	1800 [1000 - 3100]	1900 [1100 - 3300]	2700 [1700 - 4100]
Dominican Republic	1700 [900 - 2800]	1800 [1000 - 3000]	2500 [1500 - 3600]	<b>Eastern Mediterranean</b>			

Ecuador	16000 [9400 - 25500]	17000 [10300 - 27400]	23000 [15300 - 32400]	Afghanistan	13000 [12200 - 13100]	-	15000 [14000 - 15200]
El Salvador	780 [400 - 1400]	860 [400 - 1600]	1400 [800 - 2200]	Bahrain	250 [100 - 500]	280 [100 - 500]	460 [200 - 800]
Grenada	45 [0 - 100]	49 [0 - 100]	77 [0 - 200]	Djibouti	130 [0 - 200]	140 [0 - 200]	170 [100 - 300]
Guatemala	13000 [8800 - 17800]	14000 [9500 - 18900]	17000 [12000 - 20700]	Egypt	26000 [21100 - 29400]	-	30000 [24700 - 33300]
Guyana	480 [200 - 800]	530 [300 - 900]	680 [400 - 1000]	I.R. Iran*	71200	72200	95400
Haiti	660 [400 - 900]	700 [400 - 900]	790 [600 - 1000]	Iraq	38000 [33300 - 39700]	-	43000 [37800 - 45500]
Honduras	5000 [2900 - 7800]	5400 [3200 - 8300]	7100 [4700 - 9900]	Jordan	8500 [5500 - 12100]	9100 [5900 - 12900]	11000 [7700 - 14300]
<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>	<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>
Kuwait	630 [300 - 1100]	690 [300 - 1200]	1100 [600 - 1600]	Cyprus	**	**	**
Lebanon	2100 [1100 - 3700]	2300 [1200 - 4000]	3600 [2200 - 5400]	Czech Republic	3300 [1700 - 6300]	3700 [1900 - 7000]	6800 [4200 - 11200]
Libya	1600 [900 - 2700]	1700 [1000 - 2900]	2500 [1600 - 3700]	Denmark	120 [0 - 300]	130 [0 - 300]	180 [100 - 300]
Morocco	6700 [3900 - 10900]	7300 [4300 - 11700]	9700 [6500 - 13900]	England & Wales*	10400	10900	12600
Occupied Palestinian Territory	7800 [7100 - 8200]	8200 [7500 - 8600]	8900 [8100 - 9400]	Estonia	48 [0 - 100]	52 [0 - 100]	75 [0 - 200]
Oman	3300 [2000 - 4600]	3500 [2200 - 4800]	4100 [2800 - 5400]	Finland	**	**	**
Pakistan	42000 [36100 - 46600]	45000 [38200 - 49000]	48000 [41500 - 53000]	France*	5300	5700	7100
Qatar	84 [0 - 200]	93 [0 - 200]	160 [100 - 300]	Georgia	870 [400 - 1700]	930 [400 - 1800]	1100 [600 - 1900]
Saudi Arabia	3100 [1700 - 5200]	3400 [1900 - 5600]	4800 [3100 - 7100]	Germany*	2400	2600	3800
Somalia	2200 [2200 - 2300]	2300 [2300 - 2400]	2600 [2600 - 2700]	Greece	180 [0 - 400]	200 [100 - 400]	350 [100 - 600]
Sudan	5600 [5400 - 5700]	5800 [5700 - 5900]	6500 [6300 - 6600]	Hungary	2300 [1100 - 4500]	2600 [1300 - 5000]	5100 [3000 - 8700]

Syrian Arab Republic	2200 [1400 - 3000]	2300 [1500 - 3200]	2700 [1900 - 3500]	Iceland	**	**	**
Tunisia	7500 [4200 - 12500]	8200 [4700 - 13500]	12000 [7900 - 17700]	Ireland	260 [100 - 500]	280 [100 - 600]	370 [200 - 700]
United Arab Emirates	97 [0 - 200]	110 [0 - 300]	240 [100 - 500]	Israel	5600 [3500 - 8200]	5900 [3700 - 8500]	5900 [3700 - 8500]
Yemen	3000 [2600 - 3300]	3200 [2800 - 3400]	3500 [3000 - 3800]	Italy*	3800	4200	6700
<b>European</b>				Kazakhstan	6500 [3500 - 10700]	6800 [3700 - 11200]	6800 [3700 - 11200]
Albania	72 [0 - 200]	78 [0 - 200]	120 [0 - 300]	Kosovo	230 [100 - 500]	240 [100 - 500]	300 [100 - 600]
Andorra	**	**	**	Kyrgyzstan	1600 [900 - 2400]	1600 [900 - 2500]	1600 [900 - 2500]
Armenia	280 [100 - 600]	300 [100 - 600]	400 [200 - 800]	Latvia	140 [0 - 300]	150 [0 - 300]	200 [100 - 400]
Austria	300 [100 - 600]	330 [100 - 700]	480 [200 - 800]	Liechtenstein	**	**	**
Azerbaijan	580 [300 - 1100]	620 [300 - 1200]	740 [400 - 1300]	Lithuania	220 [100 - 500]	240 [100 - 500]	330 [100 - 600]
Belarus	570 [300 - 1100]	640 [300 - 1200]	1100 [700 - 1900]	Luxembourg	**	**	25 [0 - 100]
Belgium	1100 [500 - 2200]	1100 [500 - 2400]	1500 [800 - 2800]	Malta	**	**	**
Bosnia and Herzegovina	120 [0 - 300]	130 [0 - 300]	230 [100 - 400]	Monaco	**	**	**
Bulgaria	2100 [1000 - 4200]	2400 [1200 - 4600]	4600 [2700 - 7700]	Montenegro	88 [0 - 200]	95 [0 - 200]	130 [0 - 300]
<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>	<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>
Netherlands	670 [300 - 1400]	720 [300 - 1500]	1000 [500 - 1800]	Sri Lanka	4400 [2400 - 7500]	4800 [2600 - 8200]	7000 [4400 - 10400]
North Macedonia	140 [0 - 300]	150 [0 - 400]	240 [100 - 500]	Thailand	1200 [500 - 2300]	1300 [600 - 2600]	2700 [1500 - 4600]
Norway	34 [0 - 100]	36 [0 - 100]	50 [0 - 100]	Timor-Leste	210 [100 - 300]	220 [200 - 300]	230 [200 - 300]
Poland*	6600	8600	18800	<b>Western Pacific</b>			
Portugal	260 [100 - 600]	290 [100 - 600]	480 [200 - 900]	Australia	240 [100 - 500]	270 [100 - 500]	470 [200 - 800]
Republic of Moldova	310 [100 - 700]	360 [100 - 800]	810 [400 - 1500]	Brunei Darussalam	**	**	**
Romania	4700 [2500 - 8900]	5200 [2800 - 9800]	9900 [6000 - 16100]	Cambodia	1600 [900 - 2400]	1700 [1000 - 2600]	2100 [1400 - 3000]

Russian Federation*	36800	49100	93400	China	550 [200 - 1100]	620 [300 - 1200]	1100 [600 - 1900]
San Marino	**	**	**	Fiji	580 [300 - 800]	620 [400 - 900]	720 [500 - 1000]
Scotland & Northern Ireland	530 [200 - 1100]	570 [300 - 1100]	770 [400 - 1300]	Japan	860 [400 - 1700]	970 [400 - 1900]	2100 [1200 - 3600]
Serbia	180 [0 - 400]	190 [0 - 400]	310 [100 - 600]	Lao People's Democratic Republic	42 [0 - 100]	45 [0 - 100]	56 [0 - 100]
Slovakia	1000 [500 - 1900]	1100 [500 - 2100]	2200 [1300 - 3700]	Malaysia	5700 [3000 - 10300]	6300 [3400 - 11200]	10000 [6300 - 15800]
Slovenia	150 [0 - 300]	160 [0 - 400]	230 [100 - 400]	Mongolia	1700 [1100 - 2200]	1800 [1200 - 2400]	2000 [1500 - 2600]
Spain*	2800	3200	6900	New Zealand	**	**	**
Sweden	830 [400 - 1700]	890 [400 - 1800]	1100 [600 - 2000]	Papua New Guinea	590 [500 - 700]	620 [500 - 700]	660 [500 - 800]
Switzerland	290 [100 - 600]	310 [100 - 600]	460 [200 - 800]	Philippines*	16300	18100	25700
Tajikistan	160 [100 - 200]	160 [100 - 200]	160 [100 - 200]	Republic of Korea	61 [0 - 200]	70 [0 - 200]	180 [100 - 300]
Turkey	5800 [2900 - 10900]	6200 [3100 - 11500]	7400 [4300 - 12200]	Singapore	**	**	**
Ukraine	4000 [2100 - 7900]	4600 [2400 - 8800]	9700 [5800 - 16200]	Vanuatu	**	**	**
Uzbekistan	240 [100 - 500]	260 [100 - 500]	260 [100 - 500]	Viet Nam	5500 [2900 - 9300]	6000 [3300 - 10100]	9300 [5800 - 13700]
<b>South-East Asian</b>							
Bangladesh	5600 [2800 - 10200]	6200 [3200 - 11200]	9900 [6000 - 15600]				
Bhutan	**	**	**				
India*	1915400	1963300	3080300				
Indonesia	56000 [32900 - 90200]	61000 [36300 - 97300]	85000 [56600 - 120400]				
Maldives	33 [0 - 100]	37 [0 - 100]	65 [0 - 200]				
Myanmar	5300 [2900 - 9200]	5800 [3200 - 10000]	8600 [5500 - 13100]				
Nepal	1600 [800 - 2900]	1800 [900 - 3200]	3200 [1800 - 4900]				

\* This denotes our 21 study countries where no uncertainty estimates are given<sup>10</sup>.

\*\* Data are not reported due to small numbers

## Appendix 1B

Estimates by Country for COVID-19-associated  
Orphanhood and Death among Caregivers, March 1, 2020, through  
January 15, 2022, based on Real-Time Imperial COVID-19 Orphanhood  
Calculator<sup>6</sup>



Country	Minimum estimates of orphanhood [95% Credible Intervals]	Minimum estimates of primary caregiver loss [95% Credible Intervals]	Minimum estimates of primary and/or secondary caregiver loss [95% Credible Intervals]	Country	Minimum estimates of orphanhood [95% Credible Intervals]	Minimum estimates of primary caregiver loss [95% Credible Intervals]	Minimum estimates of primary and/or secondary caregiver loss [95% Credible Intervals]
<b>Africa</b>				Ghana	23000 [21500 - 23700]	-	24000 [22600 - 24900]
Algeria	66000 [46400 - 83800]	70000 [49800 - 88600]	79000 [59800 - 96000]	Guinea	7300 [7200 - 7400]	7700 [7600 - 7800]	8600 [8400 - 8800]
Angola	34000 [33800 - 33900]	36000 [35500 - 35700]	40000 [40000 - 40300]	Guinea Bissau	2700 [2600 - 2800]	2900 [2800 - 2900]	3200 [3000 - 3300]
Benin	2900 [2900 - 3000]	3100 [3000 - 3100]	3500 [3400 - 3500]	Kenya	87000 [86700 - 86800]	-	91000 [90500 - 90600]
Botswana	23000 [15600 - 30200]	24000 [16900 - 32000]	28000 [20900 - 35000]	Lesotho	8500 [6300 - 10200]	9000 [6700 - 10700]	9800 [7700 - 11500]
Burkina Faso	6200 [6100 - 6200]	6500 [6400 - 6500]	7300 [7200 - 7400]	Liberia	5100 [4900 - 5200]	5400 [5200 - 5500]	5900 [5700 - 6100]
Burundi	690 [600 - 700]	730 [700 - 800]	820 [800 - 900]	Madagascar	20000 [19700 - 20900]	-	22000 [20700 - 22000]
Cabo Verde	1300 [600 - 2200]	1400 [700 - 2400]	2000 [1200 - 3000]	Malawi	37000 [37200 - 37300]	-	41000 [40800 - 40900]
Cameroon	33000 [33000 - 33700]	35000 [34700 - 35400]	39000 [38400 - 39700]	Mali	13000 [12500 - 12600]	-	13000 [13100 - 13300]
Central African Republic	2000 [1900 - 2000]	2100 [2000 - 2100]	2300 [2200 - 2400]	Mauritania	16000 [16100 - 16400]	-	17000 [16900 - 17300]
Chad	3400 [3300 - 3400]	3500 [3500 - 3600]	4000 [3900 - 4100]	Mauritius	350 [100 - 700]	390 [200 - 800]	880 [500 - 1500]
Comoros	2800 [2700 - 2900]	3000 [2800 - 3000]	3300 [3100 - 3400]	Mozambique	39000 [38200 - 38700]	-	40000 [40200 - 40700]
Congo	6700 [6500 - 6800]	7000 [6800 - 7100]	7800 [7500 - 7900]	Namibia	55000 [45600 - 61500]	-	58000 [48400 - 64700]
Cote d'Ivoire	14000 [13400 - 13700]	14000 [14100 - 14400]	16000 [15700 - 16200]	Niger	5200 [5200 - 5300]	5500 [5500 - 5600]	6200 [6200 - 6300]
Democratic Republic of the Congo	22000 [22300 - 22400]	24000 [23400 - 23600]	27000 [26500 - 26600]	Nigeria	59000 [59300 - 59400]	-	61000 [60800 - 60900]

Country	Minimum estimates of orphanhood	Minimum estimates of primary caregiver loss	Minimum estimates of secondary caregiver loss	Country	Minimum estimates of orphanhood	Minimum estimates of primary caregiver loss	Minimum estimates of secondary caregiver loss
Equatorial Guinea	3200 [3100 - 3300]	3400 [3300 - 3400]	3700 [3600 - 3800]	Rwanda	24000 [22900 - 24900]	-	25000 [24100 - 26200] 28000 [26000 - 28900]
Eritrea	1500 [1400 - 1600]	1600 [1400 - 1700]	1700 [1600 - 1800]	Sao Tome and Principe	1200 [1100 - 1200]	1200 [1100 - 1300]	1400 [1300 - 1400]
Senegal	34000 [34100 - 34700]	36000 [35800 - 36500]	40000 [39700 - 40900]	Colombia	57000 [56900 - 56800]	-	63000 [63000 - 63100] 93000 [93000 - 93100]
Seychelles	680 [400 - 1100]	740 [400 - 1200]	960 [600 - 1400]	Costa Rica	790 [400 - 1500]	890 [400 - 1600]	1600 [900 - 2600]
Sierra Leone	2200 [2100 - 2300]	2300 [2200 - 2400]	2500 [2400 - 2700]	Cuba	670 [300 - 1300]	760 [400 - 1500]	1500 [900 - 2500]
South Africa	140000 [140600 - 140700]	-160000 [160600 - 160700]	-200000 [201700 - 201800]	Dominica	**	**	**
South Sudan	2500 [2400 - 2500]	2600 [2500 - 2600]	2900 [2800 - 3000]	Dominican Republic	1700 [900 - 2900]	1900 [1000 - 3100]	2600 [1600 - 3800]
Togo	4700 [4500 - 4800]	4900 [4700 - 5000]	5400 [5200 - 5600]	Ecuador	17000 [9700 - 26500]	18000 [10700 - 28500]	24000 [15900 - 33700]
Uganda	61000 [60900 - 61800]	65000 [64000 - 64900]	72000 [71100 - 72900]	El Salvador	820 [400 - 1500]	910 [400 - 1700]	1400 [800 - 2300]
United Republic of Tanzania	13000 [13300 - 13500]	14000 [14000 - 14200]	16000 [15700 - 16000]	Grenada	46 [0 - 100]	50 [0 - 100]	79 [0 - 200]
Zambia	70000 [68900 - 70100]	73000 [72400 - 73600]	82000 [80400 - 82700]	Guatemala	14000 [9400 - 19100]	15000 [10200 - 20300]	18000 [12800 - 22200]
Zimbabwe	89000 [89200 - 89300]	94000 [93600 - 93700]	100000 [99900 - 100000]	Guyana	580 [300 - 1000]	620 [300 - 1000]	800 [500 - 1200]
<b>Americas</b>				Haiti	760 [500 - 1000]	810 [500 - 1100]	920 [700 - 1200]
Antigua and Barbuda	25 [0 - 100]	28 [0 - 100]	44 [0 - 100]	Honduras	5100 [2900 - 7900]	5500 [3200 - 8500]	7200 [4800 - 10100]
Argentina	31000 [30700 - 30800]	33000 [32700 - 32800]	42000 [41900 - 42000]	Jamaica	490 [200 - 900]	540 [200 - 1000]	870 [500 - 1400]
Bahamas	83 [0 - 200]	92 [0 - 200]	170 [0 - 300]	Mexico	200000 [201100 - 201200]	-210000 [214100 - 214200]	-300000 [297100 - 297200]
Barbados	26 [0 - 100]	29 [0 - 100]	55 [0 - 100]	Nicaragua	97 [0 - 200]	110 [0 - 200]	140 [0 - 300]
Belize	230 [100 - 400]	250 [100 - 500]	340 [200 - 600]	Panama	4000 [2300 - 6100]	4300 [2500 - 6500]	5500 [3700 - 7600]

Bolivia (Plurinational State of)	15000 [9900 - 21300]	17000 [10800 - 22700]	20000 [14100 - 25300]	Paraguay	8200 [4800 - 12600]	8900 [5300 - 13600]	12000 [7800 - 16100]
Brazil	170000 [173600 - 173700]	-200000 [200100 - 200200]	-290000 [291700 - 291800]	Peru	81000 [81400 - 81500]	-	120000 [120300 - 120400]
Canada	2000 [1000 - 3800]	2300 [1100 - 4200]	4700 [2700 - 7600]	Saint Kitts and Nevis	**	**	**
Chile	3400 [1700 - 6700]	3800 [1900 - 7500]	7400 [4400 - 12500]	Saint Lucia	**	**	38 [0 - 100]
<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>	<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>
Saint Vincent and the Grenadines	**	**	**	Oman	3300 [2000 - 4600]	3500 [2200 - 4800]	4100 [2800 - 5400]
Suriname	580 [300 - 1000]	630 [300 - 1000]	830 [500 - 1200]	Pakistan	43000 [36800 - 47500]	-	49000 [42300 - 54000]
Trinidad and Tobago	330 [100 - 600]	370 [100 - 700]	690 [400 - 1100]	Qatar	86 [0 - 200]	95 [0 - 200]	170 [100 - 300]
United States of America	170000 [170800 - 170900]	-180000 [183100 - 183200]	-210000 [214800 - 214900]	Saudi Arabia	3200 [1800 - 5300]	3500 [1900 - 5700]	4900 [3200 - 7200]
Uruguay	1200 [600 - 2200]	1400 [600 - 2400]	2200 [1300 - 3300]	Somalia	2400 [2400 - 2500]	2600 [2500 - 2600]	2900 [2800 - 2900]
Venezuela (Bolivarian Republic of)	1900 [1100 - 3400]	2100 [1200 - 3600]	3000 [1900 - 4500]	Sudan	6000 [5900 - 6100]	6300 [6200 - 6400]	7000 [6800 - 7200]
<b>Eastern Mediterranean</b>				Syrian Arab Republic	2500 [1600 - 3500]	2700 [1700 - 3700]	3100 [2200 - 4000]
Afghanistan	13000 [12400 - 13200]	14000 [13000 - 13900]	15000 [14200 - 15400]	Tunisia	7700 [4300 - 12700]	8400 [4800 - 13800]	12000 [8000 - 18100]
Bahrain	250 [100 - 500]	280 [100 - 500]	460 [200 - 800]	United Arab Emirates	99 [0 - 200]	110 [0 - 300]	250 [100 - 500]
Djibouti	130 [0 - 200]	140 [0 - 300]	170 [100 - 300]	Yemen	3200 [2800 - 3500]	3400 [2900 - 3600]	3600 [3200 - 3900]
Egypt	31000 [25100 - 34900]	33000 [26600 - 36700]	35000 [29300 - 39500]	<b>European</b>			
Iran (Islamic Republic of)	74000 [74300 - 74400]	75000 [75400 - 75500]	100000 [99700 - 99800]	Albania	81 [0 - 200]	87 [0 - 200]	130 [0 - 300]
Iraq	39000 [34800 - 41600]	41000 [36700 - 43700]	45000 [39500 - 47600]	Andorra	**	**	**
Jordan	9900 [6400 - 14200]	11000 [7000 - 15100]	13000 [9100 - 16800]	Armenia	350 [100 - 800]	380 [200 - 800]	510 [300 - 900]
Kuwait	630 [300 - 1200]	700 [300 - 1200]	1100 [600 - 1700]	Austria	370 [100 - 700]	400 [200 - 800]	590 [300 - 1000]

Lebanon	2300 [1200 - 4100]	2600 [1300 - 4500]	3900 [2400 - 6000]	Azerbaijan	700 [300 - 1400]	740 [300 - 1400]	890 [500 - 1500]
Libya	1800 [1000 - 3000]	2000 [1100 - 3300]	2900 [1900 - 4300]	Belarus	720 [300 - 1400]	800 [400 - 1500]	1400 [800 - 2300]
Morocco	6900 [4000 - 11100]	7500 [4400 - 11900]	9900 [6700 - 14200]	Belgium	1200 [500 - 2400]	1200 [600 - 2600]	1700 [900 - 3100]
Occupied Territory	Palestinian 8400 [7700 - 8800]	8800 [8100 - 9200]	9500 [8700 - 10100]	Bosnia and Herzegovina	140 [0 - 300]	150 [0 - 300]	270 [100 - 500]
<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>	<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>
Bulgaria	2900 [1400 - 5600]	3200 [1600 - 6200]	6200 [3600 - 10200]	Montenegro	100 [0 - 200]	110 [0 - 300]	150 [0 - 300]
Croatia	220 [100 - 500]	240 [100 - 500]	390 [200 - 700]	Netherlands	770 [300 - 1600]	830 [400 - 1700]	1200 [600 - 2100]
Cyprus	**	**	**	North Macedonia	160 [0 - 400]	170 [0 - 400]	270 [100 - 500]
Czech Republic	4000 [2100 - 7600]	4400 [2300 - 8400]	8200 [5000 - 13400]	Norway	52 [0 - 100]	56 [0 - 200]	77 [0 - 200]
Denmark	160 [0 - 300]	170 [0 - 400]	230 [100 - 400]	Poland	8700 [8600 - 8700]	11000 [11400 - 11500]	25000 [24900 - 25000]
Estonia	62 [0 - 200]	67 [0 - 200]	96 [0 - 200]	Portugal	280 [100 - 600]	310 [100 - 700]	510 [200 - 900]
Finland	33 [0 - 100]	36 [0 - 100]	57 [0 - 100]	Republic of Moldova	420 [200 - 900]	480 [200 - 1000]	1100 [600 - 1900]
France	5700 [5700 - 5800]	6100 [6100 - 6200]	7700 [7600 - 7700]	Romania	5800 [3100 - 11000]	6500 [3500 - 12200]	12000 [7500 - 19900]
Georgia	1300 [600 - 2400]	1300 [600 - 2600]	1600 [900 - 2700]	Russian Federation	49000 [49400 - 49500]	- 66000 [65800 - 65900]	130000 [125200 - 125300]
Germany	2900 [2800 - 2900]	3200 [3100 - 3200]	4600 [4500 - 4600]	San Marino	**	**	**
Greece	250 [100 - 500]	280 [100 - 600]	480 [200 - 800]	Serbia	230 [100 - 500]	250 [100 - 500]	400 [200 - 700]
Hungary	3000 [1500 - 5900]	3400 [1700 - 6600]	6700 [3900 - 11300]	Slovakia	1300 [600 - 2500]	1500 [700 - 2800]	3000 [1700 - 4800]
Iceland	**	**	**	Slovenia	180 [0 - 400]	200 [100 - 400]	280 [100 - 500]
Ireland	290 [100 - 600]	310 [100 - 600]	410 [200 - 700]	Spain	2900 [2900 - 3000]	3300 [3300 - 3400]	7200 [7100 - 7200]
Israel	5800 [3600 - 8400]	6000 [3800 - 8700]	6000 [3800 - 8700]	Sweden	860 [400 - 1700]	920 [400 - 1800]	1200 [600 - 2100]

Italy	4000 [4000 - 4100]	4500 [4400 - 4500]	7200 [7100 - 7200]	Switzerland	320 [100 - 700]	340 [100 - 700]	510 [200 - 900]
Kazakhstan	7000 [3800 - 11500]	7300 [4000 - 12000]	7300 [4000 - 12000]	Tajikistan	160 [100 - 200]	160 [100 - 200]	160 [100 - 200]
Kosovo	230 [100 - 500]	250 [100 - 500]	300 [100 - 600]	Turkey	6900 [3500 - 13000]	7400 [3800 - 13700]	8900 [5100 - 14700]
Kyrgyzstan	1700 [900 - 2500]	1700 [1000 - 2600]	1500 [900 - 2200]	Ukraine	5900 [3000 - 11400]	6600 [3400 - 12800]	14000 [8400 - 23500]
Latvia	200 [100 - 400]	210 [100 - 500]	290 [100 - 500]	United Kingdom***	11000 [11200 - 11300]	12000 [11700 - 11800]	14000 [13500 - 13600]
Liechtenstein	**	**	**	Uzbekistan	280 [100 - 500]	290 [100 - 600]	300 [100 - 500]
Lithuania	290 [100 - 600]	310 [100 - 600]	430 [200 - 800]	<b>South-East Asian</b>			
Luxembourg	**	**	28 [0 - 100]	Bangladesh	5600 [2900 - 10300]	6200 [3200 - 11300]	10000 [6000 - 15800]
Malta	**	**	**	Bhutan	**	**	**
Monaco	**	**	**	India	2000000 [2030600 - 2030700]	-2100000 [2081400 - 2081500]	-3300000 [3265700 - 3265800]
<b>Country</b>	<b>Minimum estimates of orphanhood</b>	<b>Minimum estimates of primary caregiver loss</b>	<b>Minimum estimates of primary and/or secondary caregiver loss</b>				
Indonesia	57000 [33000 - 90700]	62000 [36500 - 97800]	85000 [56900 - 121000]				
Maldives	36 [0 - 100]	40 [0 - 100]	70 [0 - 200]				
Myanmar	5400 [3000 - 9500]	6000 [3300 - 10300]	8900 [5600 - 13500]				
Nepal	1700 [800 - 3000]	1900 [900 - 3300]	3200 [1900 - 5000]				
Sri Lanka	4900 [2600 - 8300]	5300 [2900 - 9000]	7700 [4900 - 11500]				
Thailand	1300 [600 - 2600]	1500 [700 - 2900]	3100 [1800 - 5200]				
Timor-Leste	210 [100 - 300]	220 [200 - 300]	230 [200 - 300]				
<b>Western Pacific</b>							
Australia	370 [100 - 700]	410 [200 - 800]	720 [400 - 1200]				
Brunei Darussalam	**	**	25 [0 - 100]				
Cambodia	1700 [900 - 2600]	1800 [1000 - 2800]	2300 [1500 - 3200]				
China	550 [200 - 1100]	620 [300 - 1200]	1100 [600 - 1900]				
Fiji	630 [400 - 900]	670 [400 - 1000]	780 [500 - 1000]				

Japan	860 [400 - 1700]	980 [400 - 1900]	2200 [1200 - 3600]
Kiribati	**	**	**
Lao People's Democratic Republic	320 [100 - 500]	340 [200 - 500]	420 [200 - 600]
Malaysia	6300 [3300 - 11300]	6900 [3700 - 12300]	11000 [6900 - 17400]
Marshall Islands	**	**	**
Micronesia (Federated States of)	**	**	**
Mongolia	2000 [1300 - 2700]	2100 [1400 - 2800]	2400 [1800 - 3100]
New Zealand	**	**	**
Palau	**	**	**
Papua New Guinea	940 [800 - 1100]	990 [800 - 1100]	1100 [900 - 1200]
Philippines	20000 [19800 - 19900]	22000 [21900 - 22000]	31000 [31100 - 31200]
Republic of Korea	130 [0 - 300]	150 [0 - 300]	400 [200 - 700]
Samoa	**	**	**
Singapore	28 [0 - 100]	32 [0 - 100]	76 [0 - 200]
Solomon Islands	**	**	**
Tonga	**	**	**
Vanuatu	**	**	**
Viet Nam	8800 [4700 - 14900]	9700 [5300 - 16200]	15000 [9300 - 22000]

\* This denotes our 21 study countries. Uncertainty is provided because we are using Johns Hopkins death data for January 15, 2022.

\*\* Data are not reported due to small numbers

\*\*\* Daily death data combines the countries making up United Kingdom.

**Appendix 1C**

Estimates by Country for COVID-19-associated Orphanhood by Age-Group and Family Circumstance (Paternal Orphanhood and Maternal Orphanhood), based on The Lancet CAH report<sup>1</sup>

Country	Maternal 0-4 [95% Credible Intervals]	Paternal 0-4 [95% Credible Intervals]	Maternal 5-9 [95% Credible Intervals]	Paternal.5-9 [95% Credible Intervals]	Maternal 10-17 [95% Credible Intervals]	Paternal 10-17 [95% Credible Intervals]
<b>African</b>						
Algeria	2.4% [1.9% - 2.9%]	5.1% [4.4% - 5.7%]	4.4% [3.8% - 5.0%]	11.8% [10.9% - 12.8%]	16.8% [15.6% - 18.0%]	59.5% [58.1% - 60.9%]
Angola	2.9% [2.2% - 3.6%]	4.6% [3.8% - 5.4%]	4.6% [3.7% - 5.4%]	12.4% [11.1% - 13.8%]	13.3% [11.9% - 14.9%]	62.2% [60.1% - 64.2%]
Benin	4.7% [2.3% - 7.6%]	9.1% [5.8% - 13.0%]	6.2% [3.4% - 9.3%]	17.4% [13.1% - 22.0%]	12.6% [8.8% - 16.6%]	50.0% [44.1% - 56.2%]
Botswana	4.1% [3.2% - 5.0%]	12.5% [11.0% - 14.1%]	6.4% [5.3% - 7.5%]	17.6% [15.9% - 19.3%]	18.2% [16.4% - 20.0%]	41.3% [39.1% - 43.3%]
Burkina Faso	3.8% [2.0% - 5.9%]	6.3% [4.0% - 8.8%]	6.0% [3.8% - 8.5%]	13.8% [10.2% - 17.2%]	17.7% [13.8% - 21.8%]	52.4% [47.1% - 57.2%]
Burundi	3.5% [0.0% - 8.7%]	10.2% [4.3% - 17.4%]	5.8% [1.4% - 11.6%]	17.1% [8.6% - 26.1%]	15.0% [7.2% - 23.2%]	48.5% [37.6% - 60.9%]
Cabo Verde	4.1% [0.9% - 8.2%]	16.4% [9.9% - 23.3%]	6.1% [2.1% - 10.7%]	19.7% [12.6% - 26.9%]	16.2% [9.9% - 23.4%]	37.5% [29.0% - 46.7%]
Cameroon	4.7% [3.8% - 5.6%]	12.5% [11.1% - 13.8%]	6.6% [5.6% - 7.6%]	19.1% [17.5% - 20.6%]	14.0% [12.6% - 15.5%]	43.2% [41.1% - 45.2%]
Central African Republic	3.8% [1.1% - 6.7%]	10.3% [6.0% - 15.5%]	5.7% [2.2% - 8.9%]	17.1% [12.1% - 22.1%]	15.0% [9.9% - 20.5%]	48.1% [40.1% - 55.3%]
Chad	3.6% [1.8% - 5.7%]	7.3% [4.7% - 10.1%]	5.6% [3.1% - 8.5%]	15.3% [11.3% - 19.5%]	14.4% [10.6% - 18.3%]	53.8% [48.2% - 59.2%]
Comoros	2.9% [1.1% - 5.1%]	12.0% [8.3% - 16.3%]	5.3% [2.6% - 8.2%]	17.2% [12.4% - 22.1%]	20.3% [15.5% - 25.5%]	42.3% [36.4% - 48.3%]
Congo	3.2% [1.7% - 5.0%]	10.7% [7.7% - 13.7%]	5.7% [3.6% - 8.0%]	17.6% [14.0% - 21.6%]	14.7% [11.2% - 18.2%]	48.0% [43.3% - 53.0%]
Cote d'Ivoire	4.5% [3.3% - 5.9%]	21.5% [19.0% - 23.9%]	6.9% [5.4% - 8.5%]	21.9% [19.5% - 24.4%]	14.5% [12.6% - 16.7%]	30.7% [28.0% - 33.4%]
Democratic Republic of the Congo	2.8% [1.9% - 3.7%]	3.2% [2.4% - 4.1%]	4.5% [3.4% - 5.6%]	10.2% [8.8% - 11.7%]	15.0% [13.2% - 16.9%]	64.3% [62.0% - 66.6%]
Equatorial Guinea	3.6% [1.6% - 5.8%]	8.7% [5.6% - 12.0%]	5.5% [2.9% - 8.1%]	15.7% [11.7% - 19.9%]	16.8% [12.7% - 21.2%]	49.8% [44.5% - 55.6%]
Eritrea	3.5% [0.0% - 7.8%]	11.5% [5.0% - 19.2%]	5.6% [1.2% - 10.4%]	17.2% [9.0% - 26.6%]	17.7% [10.1% - 26.0%]	44.4% [34.2% - 55.6%]
Eswatini	5.6% [4.3% - 7.0%]	13.4% [11.5% - 15.5%]	8.4% [6.8% - 10.1%]	17.6% [15.5% - 19.9%]	20.0% [17.7% - 22.4%]	35.1% [32.3% - 37.8%]
Ethiopia	3.3% [2.9% - 3.8%]	6.8% [6.2% - 7.3%]	5.1% [4.6% - 5.7%]	14.2% [13.3% - 15.0%]	16.4% [15.5% - 17.3%]	54.2% [53.0% - 55.4%]
Gabon	4.1% [2.2% - 6.2%]	13.7% [10.2% - 17.3%]	6.3% [4.2% - 8.9%]	18.4% [14.5% - 22.3%]	18.4% [14.7% - 22.1%]	39.2% [34.4% - 44.3%]
Gambia (Republic of The)	4.5% [2.9% - 6.3%]	12.5% [9.8% - 15.2%]	6.8% [4.9% - 9.1%]	17.8% [14.8% - 21.0%]	18.2% [15.3% - 21.7%]	40.1% [36.1% - 44.0%]
Ghana	2.7% [1.9% - 3.5%]	4.2% [3.3% - 5.2%]	4.6% [3.6% - 5.7%]	11.1% [9.6% - 12.5%]	17.7% [16.0% - 19.7%]	59.7% [57.3% - 61.9%]
Guinea	3.8% [2.4% - 5.4%]	10.5% [8.3% - 12.9%]	5.4% [3.7% - 7.2%]	18.0% [15.0% - 21.0%]	12.8% [10.3% - 15.5%]	49.5% [45.6% - 53.4%]
Guinea Bissau	5.5% [3.1% - 8.7%]	18.0% [13.5% - 22.9%]	7.4% [4.3% - 10.8%]	21.9% [16.5% - 27.0%]	12.7% [8.7% - 17.0%]	34.5% [28.5% - 40.5%]
Kenya*	2.9% [2.5% - 3.2%]	18.9% [18.2% - 19.6%]	4.3% [3.9% - 4.7%]	22.3% [21.6% - 23.0%]	9.9% [9.1% - 10.7%]	41.8% [40.7% - 42.7%]



Lesotho	4.6% [3.1% - 6.0%]	14.2% [11.9% - 16.6%]	7.3% [5.4% - 9.1%]	18.4% [15.9% - 21.3%]	19.3% [16.4% - 22.1%]	36.2% [32.9% - 39.7%]
Liberia	4.4% [2.7% - 6.3%]	11.0% [8.2% - 13.8%]	6.4% [4.3% - 8.7%]	18.1% [14.5% - 21.6%]	14.3% [11.2% - 17.5%]	45.8% [41.2% - 50.4%]
<b>Country</b>	<b>Maternal 0-4</b>	<b>Paternal 0-4</b>	<b>Maternal 5-9</b>	<b>Paternal 5-9</b>	<b>Maternal 10-17</b>	<b>Paternal 10-17</b>
Madagascar	3.4% [2.6% - 4.3%]	7.8% [6.5% - 9.3%]	5.4% [4.2% - 6.6%]	15.0% [13.2% - 16.9%]	16.9% [15.1% - 18.9%]	51.4% [48.9% - 53.8%]
Malawi*	3.6% [3.1% - 4.3%]	14.2% [13.3% - 15.3%]	4.6% [4.0% - 5.3%]	19.2% [18.1% - 20.2%]	12.0% [10.5% - 13.3%]	46.4% [44.6% - 48.1%]
Mali	2.7% [1.6% - 3.8%]	3.9% [2.7% - 5.1%]	4.3% [3.1% - 5.7%]	11.4% [9.4% - 13.6%]	13.9% [11.7% - 16.1%]	63.8% [60.7% - 66.9%]
Mauritania	3.7% [2.7% - 4.8%]	9.4% [7.9% - 10.9%]	5.6% [4.4% - 6.8%]	16.3% [14.2% - 18.2%]	16.7% [14.8% - 18.7%]	48.4% [45.7% - 51.1%]
Mauritius	2.1% [0.0% - 16.7%]	11.0% [0.0% - 40.0%]	3.4% [0.0% - 22.3%]	15.7% [0.0% - 50.0%]	13.0% [0.0% - 42.9%]	54.8% [16.6% - 87.5%]
Mozambique	2.6% [1.9% - 3.2%]	2.9% [2.3% - 3.6%]	4.3% [3.5% - 5.1%]	9.5% [8.4% - 10.6%]	16.4% [14.8% - 18.0%]	64.3% [62.3% - 66.4%]
Namibia	3.7% [3.1% - 4.3%]	8.5% [7.6% - 9.4%]	5.7% [5.0% - 6.5%]	15.1% [14.0% - 16.2%]	19.2% [17.9% - 20.4%]	47.8% [46.4% - 49.3%]
Niger	4.0% [2.0% - 6.2%]	10.4% [7.4% - 13.7%]	5.7% [3.3% - 8.3%]	18.9% [14.9% - 23.2%]	11.1% [7.9% - 14.4%]	49.8% [44.7% - 55.1%]
Nigeria*	2.8% [2.3% - 3.2%]	16.0% [15.5% - 16.5%]	3.7% [3.2% - 4.2%]	21.6% [21.1% - 22.2%]	8.0% [7.1% - 8.9%]	47.9% [46.8% - 48.9%]
Rwanda	3.4% [2.6% - 4.1%]	6.4% [5.4% - 7.5%]	5.8% [4.8% - 6.9%]	13.2% [11.8% - 14.6%]	20.8% [19.0% - 22.7%]	50.3% [48.2% - 52.5%]
Sao Tome and Principe	3.7% [0.0% - 8.0%]	13.2% [7.0% - 20.8%]	5.7% [1.9% - 10.9%]	18.7% [11.2% - 27.0%]	17.2% [9.9% - 25.1%]	41.6% [31.6% - 51.5%]
Senegal	3.8% [3.2% - 4.5%]	9.7% [8.6% - 10.8%]	5.8% [5.0% - 6.6%]	16.6% [15.2% - 18.0%]	16.4% [15.1% - 17.8%]	47.6% [45.7% - 49.4%]
Seychelles	1.7% [0.0% - 5.8%]	8.9% [1.9% - 17.7%]	2.8% [0.0% - 8.2%]	15.0% [6.1% - 25.0%]	11.8% [4.3% - 20.9%]	59.7% [47.2% - 71.9%]
Sierra Leone	3.6% [1.4% - 6.6%]	9.5% [5.6% - 13.6%]	5.5% [2.8% - 8.8%]	17.0% [11.8% - 22.2%]	14.0% [9.4% - 19.2%]	50.3% [43.0% - 57.3%]
South Africa*	5.0% [4.8% - 5.3%]	15.0% [14.5% - 15.5%]	7.7% [7.4% - 8.0%]	18.8% [18.3% - 19.3%]	18.5% [18.0% - 19.0%]	34.9% [34.2% - 35.6%]
South Sudan	3.1% [1.2% - 5.4%]	6.0% [3.3% - 9.2%]	4.6% [2.0% - 7.5%]	13.7% [9.1% - 18.3%]	15.0% [10.8% - 20.0%]	57.6% [51.4% - 64.0%]
Togo	3.6% [1.8% - 5.5%]	7.5% [5.1% - 10.2%]	5.6% [3.5% - 7.9%]	15.2% [11.9% - 18.5%]	15.7% [12.3% - 19.2%]	52.4% [47.7% - 57.0%]
Uganda	5.1% [4.2% - 6.1%]	14.9% [13.4% - 16.4%]	6.6% [5.6% - 7.7%]	21.4% [19.7% - 23.1%]	11.0% [9.9% - 12.2%]	40.8% [38.8% - 42.9%]
United Republic of Tanzania	3.4% [2.4% - 4.5%]	6.5% [5.1% - 8.0%]	5.3% [4.0% - 6.6%]	14.1% [12.2% - 16.2%]	15.5% [13.4% - 17.6%]	55.1% [52.4% - 57.9%]
Zambia	4.3% [3.6% - 5.0%]	12.7% [11.6% - 13.8%]	6.5% [5.7% - 7.3%]	19.1% [17.9% - 20.3%]	14.7% [13.6% - 15.7%]	42.7% [41.3% - 44.3%]
Zimbabwe*	7.3% [6.7% - 8.0%]	18.2% [17.2% - 19.3%]	8.1% [7.6% - 8.7%]	20.9% [19.9% - 21.7%]	12.6% [11.8% - 13.6%]	32.8% [31.5% - 34.1%]
<b>American</b>						
Antigua and Barbuda	2.0% [0.0% - 10.0%]	8.7% [0.0% - 22.3%]	3.6% [0.0% - 13.7%]	15.2% [0.0% - 31.3%]	13.5% [0.0% - 29.5%]	57.0% [35.7% - 77.8%]

Argentina*	3.2% [3.0% - 3.4%]	11.1% [10.5% - 11.6%]	4.8% [4.6% - 5.1%]	16.8% [16.1% - 17.4%]	15.0% [14.5% - 15.5%]	49.2% [48.3% - 50.0%]
Bahamas	2.7% [0.0% - 6.9%]	9.9% [3.5% - 17.8%]	3.8% [0.0% - 8.9%]	15.8% [7.1% - 25.0%]	14.6% [6.6% - 23.3%]	53.3% [41.8% - 65.2%]
Barbados	1.3% [0.0% - 10.0%]	7.4% [0.0% - 23.1%]	2.2% [0.0% - 11.8%]	14.2% [0.0% - 35.3%]	11.3% [0.0% - 30.8%]	63.6% [36.3% - 90.0%]
Belize	2.8% [0.6% - 5.6%]	7.6% [3.9% - 12.1%]	4.5% [1.6% - 7.9%]	14.1% [8.8% - 19.1%]	18.4% [12.7% - 25.2%]	52.6% [44.7% - 60.3%]
Bolivia (Plurinational State of)	4.3% [3.9% - 4.7%]	14.4% [13.7% - 15.1%]	6.4% [5.9% - 6.9%]	18.7% [17.9% - 19.5%]	17.6% [16.9% - 18.3%]	38.7% [37.8% - 39.6%]
<b>Country</b>	<b>Maternal 0-4</b>	<b>Paternal 0-4</b>	<b>Maternal 5-9</b>	<b>Paternal.5-9</b>	<b>Maternal 10-17</b>	<b>Paternal 10-17</b>
Brazil*	3.3% [3.2% - 3.4%]	15.6% [15.0% - 16.2%]	5.0% [4.8% - 5.2%]	19.7% [19.2% - 20.2%]	14.4% [14.1% - 14.7%]	42.0% [41.4% - 42.6%]
Canada	4.3% [3.4% - 5.4%]	15.3% [13.6% - 17.2%]	6.6% [5.4% - 7.9%]	19.3% [17.4% - 21.4%]	14.8% [12.9% - 16.4%]	39.7% [37.3% - 42.1%]
Chile	2.5% [1.9% - 3.1%]	10.9% [9.7% - 12.1%]	4.0% [3.3% - 4.7%]	17.0% [15.7% - 18.4%]	13.3% [12.1% - 14.5%]	52.4% [50.4% - 54.2%]
Colombia*	2.8% [2.6% - 3.0%]	10.8% [10.2% - 11.3%]	4.6% [4.3% - 4.9%]	16.6% [16.0% - 17.2%]	15.2% [14.7% - 15.7%]	50.1% [49.1% - 51.0%]
Costa Rica	3.0% [1.7% - 4.4%]	10.7% [8.5% - 13.0%]	4.7% [3.0% - 6.3%]	16.6% [13.9% - 19.5%]	15.1% [12.5% - 17.9%]	50.0% [46.3% - 53.8%]
Cuba	0.7% [0.1% - 1.5%]	2.7% [1.4% - 4.0%]	1.4% [0.5% - 2.6%]	8.5% [6.3% - 10.9%]	9.8% [7.4% - 12.3%]	76.9% [73.5% - 80.5%]
Dominica	2.1% [0.0% - 33.4%]	9.1% [0.0% - 50.0%]	4.5% [0.0% - 50.0%]	16.1% [0.0% - 66.7%]	13.2% [0.0% - 60.0%]	55.0% [0.0% - 100.0%]
Dominican Republic	2.8% [2.0% - 3.7%]	10.1% [8.6% - 11.7%]	4.3% [3.3% - 5.4%]	16.2% [14.3% - 18.0%]	15.9% [14.0% - 17.7%]	50.5% [48.1% - 53.0%]
Ecuador	3.7% [3.4% - 4.0%]	13.9% [13.4% - 14.6%]	5.6% [5.2% - 6.0%]	18.6% [17.9% - 19.3%]	16.3% [15.7% - 17.0%]	41.8% [41.0% - 42.7%]
El Salvador	4.6% [3.1% - 6.2%]	14.6% [12.0% - 17.2%]	6.4% [4.6% - 8.2%]	19.1% [16.2% - 22.1%]	15.4% [12.8% - 18.3%]	39.9% [36.3% - 43.4%]
Grenada	2.1% [0.0% - 7.2%]	9.5% [1.4% - 19.1%]	4.0% [0.0% - 11.2%]	16.0% [6.2% - 28.9%]	15.0% [4.8% - 26.4%]	53.4% [38.6% - 69.3%]
Guatemala	3.7% [3.3% - 4.2%]	8.4% [7.8% - 9.0%]	5.9% [5.4% - 6.4%]	14.9% [14.1% - 15.6%]	19.4% [18.5% - 20.2%]	47.8% [46.7% - 48.9%]
Guyana	2.1% [0.7% - 3.6%]	8.0% [5.6% - 10.8%]	2.9% [1.3% - 4.5%]	14.4% [10.9% - 18.1%]	16.0% [12.4% - 19.6%]	56.6% [51.6% - 61.4%]
Haiti	4.5% [3.0% - 6.1%]	17.7% [14.8% - 20.7%]	6.5% [4.7% - 8.4%]	20.1% [16.8% - 23.3%]	16.8% [13.9% - 19.8%]	34.3% [30.5% - 38.1%]
Honduras	3.8% [3.2% - 4.5%]	14.5% [13.5% - 15.6%]	6.0% [5.3% - 6.9%]	18.3% [17.1% - 19.6%]	19.6% [18.3% - 20.9%]	37.6% [36.2% - 39.1%]
Jamaica	2.2% [0.9% - 3.9%]	11.1% [8.1% - 14.2%]	3.7% [1.9% - 5.9%]	17.1% [13.5% - 21.1%]	14.8% [11.2% - 18.5%]	51.0% [46.1% - 55.7%]
Mexico*	3.4% [3.3% - 3.6%]	9.8% [9.7% - 9.9%]	5.9% [5.8% - 6.1%]	16.7% [16.5% - 16.8%]	18.1% [17.8% - 18.3%]	46.1% [45.9% - 46.4%]
Nicaragua	4.7% [0.8% - 9.0%]	19.1% [11.1% - 27.8%]	6.5% [1.8% - 11.9%]	20.3% [12.0% - 29.6%]	16.0% [8.5% - 24.3%]	33.4% [23.8% - 43.8%]
Panama	3.4% [2.7% - 4.0%]	15.0% [13.7% - 16.2%]	5.3% [4.5% - 6.1%]	19.3% [17.9% - 20.6%]	14.9% [13.7% - 16.0%]	42.2% [40.5% - 43.9%]
Paraguay	4.3% [3.8% - 4.9%]	21.6% [20.5% - 22.6%]	5.9% [5.3% - 6.6%]	21.8% [20.8% - 22.9%]	13.2% [12.3% - 14.0%]	33.1% [31.9% - 34.3%]

Peru*	3.3% [3.1% - 3.6%]	12.7% [12.0% - 13.5%]	5.2% [4.9% - 5.4%]	18.6% [17.7% - 19.3%]	14.2% [13.8% - 14.8%]	46.0% [44.9% - 46.9%]
Saint Kitts and Nevis	1.5% [0.0% - 33.4%]	5.6% [0.0% - 100.0%]	2.6% [0.0% - 50.0%]	13.6% [0.0% - 100.0%]	13.8% [0.0% - 100.0%]	62.8% [0.0% - 100.0%]
Saint Lucia	2.2% [0.0% - 12.6%]	14.1% [0.0% - 33.4%]	4.4% [0.0% - 20.0%]	19.0% [0.0% - 44.5%]	12.7% [0.0% - 35.8%]	47.6% [19.9% - 77.9%]
Saint Vincent and the Grenadines	2.0% [0.0% - 14.3%]	10.8% [0.0% - 33.4%]	3.1% [0.0% - 18.2%]	17.4% [0.0% - 44.5%]	13.3% [0.0% - 40.0%]	53.4% [22.2% - 84.7%]
Suriname	2.9% [1.5% - 4.5%]	17.7% [14.3% - 21.2%]	4.5% [2.8% - 6.5%]	20.2% [16.9% - 23.9%]	13.7% [10.8% - 16.7%]	40.9% [36.5% - 45.5%]
Trinidad and Tobago	2.0% [0.0% - 4.5%]	8.0% [4.2% - 12.5%]	3.5% [1.0% - 6.8%]	14.7% [9.3% - 20.2%]	13.5% [8.4% - 19.1%]	58.3% [50.8% - 66.0%]
Uruguay	3.8% [2.7% - 5.1%]	14.7% [12.6% - 16.8%]	5.7% [4.4% - 7.2%]	19.4% [17.1% - 21.8%]	14.8% [12.8% - 16.9%]	41.5% [38.3% - 44.6%]
<b>Country</b>	<b>Maternal 0-4</b>	<b>Paternal 0-4</b>	<b>Maternal 5-9</b>	<b>Paternal 5-9</b>	<b>Maternal 10-17</b>	<b>Paternal 10-17</b>
USA*	5.5% [5.4% - 5.6%]	14.8% [14.6% - 14.9%]	7.5% [7.4% - 7.6%]	18.0% [17.9% - 18.1%]	16.6% [16.4% - 16.8%]	37.7% [37.5% - 37.8%]
Venezuela (Bolivarian Republic of)	3.1% [2.3% - 4.0%]	10.8% [9.3% - 12.5%]	4.9% [3.8% - 5.9%]	16.8% [15.0% - 18.8%]	15.7% [13.9% - 17.4%]	48.6% [46.2% - 51.0%]
<b>Eastern Mediterranean</b>						
Afghanistan	4.9% [4.4% - 5.5%]	13.0% [12.2% - 13.8%]	6.8% [6.1% - 7.4%]	19.2% [18.3% - 20.2%]	13.9% [13.1% - 14.8%]	42.2% [41.0% - 43.4%]
Bahrain	6.5% [3.5% - 9.8%]	20.0% [14.7% - 25.5%]	7.7% [4.3% - 11.6%]	19.2% [14.5% - 24.2%]	15.9% [11.4% - 21.1%]	30.6% [24.8% - 36.3%]
Djibouti	6.1% [2.2% - 10.8%]	19.4% [13.2% - 26.4%]	7.8% [3.2% - 13.2%]	20.7% [13.3% - 28.6%]	15.7% [9.5% - 22.4%]	30.2% [22.1% - 38.6%]
Egypt	2.2% [1.8% - 2.7%]	2.3% [1.9% - 2.6%]	3.4% [2.9% - 3.9%]	8.0% [7.2% - 8.8%]	15.1% [13.8% - 16.3%]	69.1% [67.3% - 70.6%]
I.R. Iran*	3.7% [3.5% - 3.9%]	13.2% [12.9% - 13.4%]	5.2% [5.0% - 5.3%]	18.0% [17.8% - 18.2%]	13.2% [12.9% - 13.5%]	46.7% [46.4% - 47.1%]
Iraq	2.7% [2.5% - 3.1%]	5.8% [5.4% - 6.1%]	4.7% [4.4% - 5.1%]	12.4% [11.9% - 13.0%]	20.0% [19.3% - 20.8%]	54.3% [53.5% - 55.2%]
Jordan	2.8% [2.4% - 3.3%]	6.8% [6.2% - 7.5%]	4.7% [4.1% - 5.3%]	13.3% [12.4% - 14.1%]	19.8% [18.8% - 20.9%]	52.5% [51.2% - 53.8%]
Kuwait	10.3% [7.7% - 13.0%]	21.6% [18.1% - 25.1%]	12.0% [9.2% - 14.8%]	18.7% [15.4% - 21.9%]	15.4% [12.3% - 18.6%]	22.0% [18.5% - 25.5%]
Lebanon	2.5% [1.8% - 3.3%]	14.0% [12.4% - 15.6%]	4.2% [3.2% - 5.1%]	18.3% [16.5% - 20.0%]	15.0% [13.2% - 16.7%]	46.0% [43.7% - 48.2%]
Libya	1.7% [1.1% - 2.5%]	2.5% [1.6% - 3.3%]	3.3% [2.4% - 4.4%]	8.1% [6.7% - 9.6%]	17.3% [15.3% - 19.4%]	67.0% [64.4% - 69.6%]
Morocco	2.4% [2.0% - 2.8%]	8.8% [8.1% - 9.6%]	4.0% [3.4% - 4.5%]	15.3% [14.4% - 16.3%]	15.6% [14.6% - 16.5%]	54.0% [52.7% - 55.3%]
Occupied Palestinian Territory	3.8% [3.2% - 4.4%]	12.8% [11.8% - 13.8%]	6.6% [5.8% - 7.4%]	17.9% [16.8% - 19.1%]	19.6% [18.4% - 20.9%]	39.3% [37.8% - 40.7%]
Oman	8.9% [7.5% - 10.5%]	10.9% [9.6% - 12.3%]	11.1% [9.6% - 12.6%]	15.7% [14.2% - 17.4%]	19.5% [17.7% - 21.3%]	33.9% [31.8% - 36.0%]
Pakistan	2.9% [2.7% - 3.2%]	7.1% [6.8% - 7.5%]	4.7% [4.5% - 5.1%]	14.2% [13.7% - 14.7%]	17.0% [16.4% - 17.5%]	54.0% [53.2% - 54.7%]
Qatar	20.8% [11.4% - 31.0%]	36.2% [26.0% - 46.7%]	16.9% [9.2% - 25.6%]	13.1% [5.7% - 21.1%]	8.5% [2.7% - 15.2%]	4.5% [0.0% - 9.6%]

Saudi Arabia	4.4% [3.6% - 5.2%]	13.7% [12.3% - 15.0%]	6.9% [5.9% - 8.0%]	16.8% [15.2% - 18.3%]	20.6% [19.0% - 22.2%]	37.5% [35.6% - 39.5%]
Somalia	3.0% [2.2% - 3.9%]	8.4% [7.1% - 9.8%]	4.4% [3.5% - 5.5%]	16.2% [14.5% - 18.0%]	12.4% [11.0% - 14.1%]	55.6% [53.3% - 58.0%]
Sudan	3.3% [2.8% - 4.0%]	11.7% [10.8% - 12.7%]	5.1% [4.4% - 5.8%]	18.4% [17.1% - 19.6%]	14.6% [13.6% - 15.8%]	46.8% [45.3% - 48.3%]
Syrian Arab Republic	3.8% [2.9% - 4.8%]	9.3% [8.0% - 10.6%]	5.8% [4.8% - 6.9%]	15.9% [14.3% - 17.5%]	17.2% [15.6% - 19.0%]	47.9% [45.6% - 50.2%]
Tunisia	1.0% [0.7% - 1.4%]	1.5% [1.2% - 1.9%]	2.1% [1.6% - 2.5%]	6.2% [5.5% - 6.9%]	14.3% [13.1% - 15.7%]	74.8% [73.3% - 76.3%]
United Arab Emirates	12.3% [5.3% - 19.5%]	42.0% [31.9% - 52.3%]	11.7% [5.5% - 19.0%]	17.4% [10.3% - 25.1%]	8.8% [3.2% - 14.8%]	7.9% [2.9% - 14.1%]
Yemen	4.4% [3.5% - 5.2%]	10.9% [9.8% - 12.1%]	7.0% [6.1% - 8.0%]	16.4% [15.0% - 17.8%]	21.4% [19.9% - 23.0%]	39.9% [38.0% - 41.9%]
<b>European</b>						
<b>Country</b>	<b>Maternal 0-4</b>	<b>Paternal 0-4</b>	<b>Maternal 5-9</b>	<b>Paternal 5-9</b>	<b>Maternal 10-17</b>	<b>Paternal 10-17</b>
Albania	3.3% [0.0% - 8.2%]	8.5% [2.3% - 15.7%]	4.6% [0.0% - 9.7%]	15.8% [7.4% - 25.6%]	14.5% [6.4% - 23.5%]	53.3% [40.6% - 65.3%]
Andorra	0.9% [0.0% - 0.1%]	5.3% [0.0% - 100.0%]	1.8% [0.0% - 0.1%]	14.0% [0.0% - 100.0%]	10.7% [0.0% - 100.0%]	67.3% [0.0% - 100.0%]
Armenia	2.2% [0.4% - 4.1%]	8.3% [4.9% - 12.0%]	3.7% [1.5% - 6.2%]	15.2% [11.0% - 19.6%]	13.5% [9.5% - 17.7%]	57.1% [51.1% - 63.0%]
Austria	3.4% [1.4% - 5.9%]	10.6% [6.9% - 14.7%]	5.1% [2.6% - 7.8%]	16.6% [12.3% - 20.7%]	14.0% [10.0% - 18.2%]	50.2% [44.3% - 56.3%]
Azerbaijan	2.2% [1.1% - 3.6%]	12.3% [9.5% - 15.2%]	3.9% [2.4% - 5.8%]	17.6% [14.1% - 21.0%]	13.2% [10.3% - 16.2%]	50.8% [46.5% - 55.0%]
Belarus	2.2% [1.0% - 3.5%]	10.8% [7.9% - 13.7%]	3.9% [2.2% - 5.8%]	17.3% [14.0% - 20.5%]	12.2% [9.4% - 15.2%]	53.7% [49.0% - 57.9%]
Belgium	4.1% [2.9% - 5.5%]	13.0% [10.9% - 15.1%]	6.5% [4.8% - 8.1%]	18.1% [15.6% - 20.5%]	15.4% [13.1% - 17.8%]	42.9% [39.8% - 45.7%]
Bosnia and Herzegovina	1.5% [0.0% - 4.3%]	8.5% [3.7% - 14.1%]	2.6% [0.0% - 6.0%]	15.2% [9.2% - 22.3%]	10.1% [4.6% - 15.7%]	62.1% [52.6% - 71.5%]
Bulgaria	3.0% [2.2% - 4.0%]	20.6% [18.5% - 22.8%]	5.2% [4.2% - 6.4%]	22.7% [20.6% - 24.8%]	11.2% [9.6% - 12.8%]	37.2% [34.8% - 39.8%]
Croatia	3.3% [0.7% - 6.4%]	16.9% [11.1% - 23.4%]	5.6% [2.1% - 9.3%]	21.1% [14.5% - 28.2%]	12.1% [6.3% - 17.5%]	41.0% [33.3% - 49.7%]
Cyprus	4.0% [0.0% - 25.0%]	13.0% [0.0% - 40.0%]	5.5% [0.0% - 28.6%]	18.0% [0.0% - 50.0%]	14.7% [0.0% - 45.6%]	44.9% [0.0% - 83.4%]
Czech Republic	4.0% [3.1% - 4.9%]	20.6% [18.9% - 22.4%]	6.6% [5.5% - 7.7%]	22.2% [20.3% - 23.9%]	12.5% [11.1% - 13.8%]	34.2% [32.0% - 36.1%]
Denmark	5.9% [2.1% - 10.5%]	22.9% [15.8% - 30.5%]	8.0% [3.2% - 13.3%]	21.8% [14.4% - 30.5%]	13.3% [7.3% - 19.2%]	28.2% [20.2% - 37.5%]
England & Wales*	4.2% [3.9% - 4.4%]	10.2% [9.9% - 10.4%]	6.6% [6.3% - 6.9%]	16.9% [16.6% - 17.2%]	16.4% [15.9% - 16.9%]	45.8% [45.1% - 46.3%]
Estonia	3.2% [0.0% - 9.6%]	17.8% [7.1% - 29.3%]	6.1% [0.0% - 14.0%]	21.3% [9.9% - 34.0%]	13.0% [3.8% - 24.2%]	38.6% [24.3% - 52.2%]
Finland	5.7% [0.0% - 17.7%]	15.5% [0.0% - 33.4%]	9.0% [0.0% - 25.0%]	19.4% [3.8% - 39.2%]	16.4% [0.0% - 33.4%]	33.9% [13.3% - 55.6%]
France*	3.2% [2.9% - 3.5%]	8.4% [8.0% - 8.7%]	5.6% [5.3% - 6.0%]	15.2% [14.7% - 15.5%]	17.6% [16.8% - 18.4%]	50.0% [49.2% - 50.9%]

Georgia	2.6% [1.5% - 3.7%]	9.1% [7.2% - 11.3%]	4.7% [3.3% - 6.2%]	16.3% [13.7% - 19.0%]	14.0% [11.5% - 16.8%]	53.2% [49.5% - 57.1%]
Germany*	3.4% [3.0% - 3.9%]	10.0% [9.4% - 10.5%]	5.2% [4.7% - 5.7%]	16.1% [15.7% - 16.6%]	15.0% [14.1% - 15.9%]	50.2% [49.2% - 51.4%]
Greece	3.1% [0.7% - 6.1%]	17.6% [12.0% - 24.0%]	5.3% [2.0% - 9.1%]	21.6% [15.3% - 28.5%]	12.3% [7.5% - 17.2%]	40.1% [32.9% - 47.6%]
Hungary	3.6% [2.8% - 4.5%]	16.8% [15.1% - 18.5%]	5.8% [4.7% - 6.9%]	21.0% [19.2% - 23.0%]	12.8% [11.3% - 14.5%]	40.0% [37.6% - 42.2%]
Iceland	5.1% [0.0% - 100.0%]	13.4% [0.0% - 100.0%]	7.6% [0.0% - 100.0%]	18.6% [0.0% - 100.0%]	17.2% [0.0% - 100.0%]	38.1% [0.0% - 100.0%]
Ireland	5.1% [2.5% - 8.2%]	7.8% [4.5% - 11.4%]	7.7% [4.7% - 11.3%]	12.8% [8.5% - 17.4%]	22.9% [17.7% - 28.4%]	43.6% [37.9% - 49.8%]
Israel	3.6% [2.9% - 4.3%]	5.4% [4.6% - 6.1%]	5.9% [5.2% - 6.7%]	11.5% [10.5% - 12.5%]	22.6% [21.1% - 24.1%]	51.1% [49.5% - 52.8%]
Italy*	2.3% [2.0% - 2.6%]	7.8% [7.5% - 8.1%]	4.4% [4.1% - 4.8%]	15.1% [14.7% - 15.5%]	15.1% [14.3% - 15.7%]	55.4% [54.5% - 56.2%]
Kazakhstan	2.4% [1.9% - 2.9%]	8.2% [7.3% - 9.0%]	4.5% [3.9% - 5.1%]	14.7% [13.6% - 15.8%]	16.0% [14.8% - 17.2%]	54.3% [52.7% - 55.8%]
Kosovo	3.3% [1.0% - 5.9%]	14.9% [10.3% - 19.9%]	5.3% [2.5% - 8.8%]	18.9% [13.7% - 24.6%]	15.8% [11.1% - 20.5%]	41.8% [35.1% - 48.9%]
<b>Country</b>	<b>Maternal 0-4</b>	<b>Paternal 0-4</b>	<b>Maternal 5-9</b>	<b>Paternal.5-9</b>	<b>Maternal 10-17</b>	<b>Paternal 10-17</b>
Kyrgyzstan	3.1% [2.1% - 4.0%]	10.5% [8.9% - 12.1%]	5.4% [4.1% - 6.6%]	16.7% [14.8% - 18.7%]	16.2% [14.1% - 18.2%]	48.2% [45.3% - 50.9%]
Latvia	2.8% [0.0% - 5.9%]	16.9% [10.7% - 23.3%]	4.8% [1.5% - 8.7%]	21.5% [14.7% - 28.6%]	11.0% [6.0% - 16.7%]	43.0% [34.2% - 51.4%]
Liechtenstein	10.6% [0.0% - 100.0%]	6.6% [0.0% - 100.0%]	12.5% [0.0% - 100.0%]	10.2% [0.0% - 100.0%]	28.4% [0.0% - 100.0%]	31.7% [0.0% - 100.0%]
Lithuania	2.3% [0.5% - 4.6%]	9.4% [5.4% - 13.6%]	4.0% [1.4% - 7.1%]	16.6% [11.6% - 21.3%]	12.6% [8.3% - 17.1%]	55.1% [48.5% - 61.7%]
Luxembourg	9.7% [0.0% - 27.3%]	14.1% [0.0% - 35.4%]	11.6% [0.0% - 33.4%]	15.0% [0.0% - 33.4%]	20.7% [0.0% - 44.5%]	28.9% [7.1% - 53.4%]
Malta	6.1% [0.0% - 25.0%]	17.7% [0.0% - 44.5%]	8.7% [0.0% - 30.0%]	21.3% [0.0% - 50.0%]	13.5% [0.0% - 42.9%]	32.7% [0.0% - 64.8%]
Monaco	20.4% [0.0% - 100.0%]	14.7% [0.0% - 100.0%]	22.7% [0.0% - 100.0%]	11.6% [0.0% - 100.0%]	19.2% [0.0% - 100.0%]	11.4% [0.0% - 100.0%]
Montenegro	2.4% [0.0% - 6.0%]	15.0% [7.7% - 22.3%]	4.1% [0.0% - 9.0%]	20.3% [11.2% - 29.7%]	11.1% [4.8% - 18.5%]	47.0% [35.6% - 58.9%]
Netherlands	3.8% [2.2% - 5.5%]	10.7% [8.2% - 13.5%]	5.6% [3.9% - 7.6%]	16.7% [13.5% - 19.7%]	15.5% [12.4% - 18.4%]	47.8% [43.9% - 51.9%]
North Macedonia	2.6% [0.0% - 5.7%]	11.9% [6.5% - 17.7%]	4.2% [1.0% - 7.9%]	17.9% [11.3% - 24.7%]	12.5% [6.6% - 18.3%]	51.0% [41.6% - 59.5%]
Norway	5.8% [0.0% - 14.7%]	15.4% [3.8% - 29.2%]	8.4% [0.0% - 19.3%]	18.3% [5.5% - 31.9%]	16.9% [4.5% - 30.5%]	35.2% [19.9% - 50.8%]
Poland*	2.9% [2.7% - 3.2%]	12.8% [12.5% - 13.2%]	5.0% [4.7% - 5.3%]	18.3% [18.0% - 18.7%]	13.6% [13.1% - 14.3%]	47.3% [46.6% - 47.9%]
Portugal	3.2% [1.2% - 5.7%]	19.6% [14.6% - 24.3%]	5.0% [2.6% - 8.0%]	22.2% [17.2% - 27.5%]	11.4% [7.5% - 15.4%]	38.6% [32.4% - 44.6%]
Republic of Moldova	2.2% [0.7% - 4.0%]	8.9% [5.8% - 12.4%]	4.1% [1.8% - 6.7%]	15.8% [11.9% - 20.3%]	14.3% [10.2% - 18.2%]	54.6% [48.6% - 60.6%]
Romania	2.9% [2.4% - 3.5%]	15.0% [13.8% - 16.2%]	4.7% [4.0% - 5.5%]	19.9% [18.6% - 21.3%]	12.3% [11.1% - 13.3%]	45.2% [43.7% - 46.8%]

Russian Federation	1.8% [1.6% - 2.0%]	6.5% [6.1% - 6.9%]	3.3% [3.1% - 3.6%]	13.5% [12.9% - 14.1%]	13.5% [12.9% - 14.1%]	61.4% [60.6% - 62.1%]
San Marino	2.3% [0.0% - 50.0%]	9.6% [0.0% - 100.0%]	4.3% [0.0% - 50.0%]	15.5% [0.0% - 100.0%]	13.4% [0.0% - 100.0%]	55.0% [0.0% - 100.0%]
Scotland & Northern Ireland	4.1% [2.4% - 6.0%]	12.9% [9.9% - 15.9%]	6.2% [4.2% - 8.5%]	18.3% [14.7% - 21.5%]	14.7% [11.7% - 17.7%]	43.8% [39.2% - 48.6%]
Serbia	2.5% [0.5% - 5.2%]	10.8% [6.1% - 15.8%]	4.2% [1.2% - 7.7%]	17.6% [12.0% - 23.5%]	12.5% [7.4% - 17.9%]	52.4% [44.7% - 60.1%]
Slovakia	3.0% [1.8% - 4.3%]	12.8% [10.6% - 15.1%]	4.9% [3.6% - 6.4%]	18.5% [15.9% - 21.0%]	13.4% [11.0% - 15.6%]	47.4% [43.9% - 50.9%]
Slovenia	2.7% [0.3% - 5.9%]	10.1% [5.3% - 15.0%]	5.0% [1.7% - 9.0%]	16.9% [10.7% - 23.3%]	13.7% [8.2% - 19.9%]	51.6% [43.5% - 60.2%]
Spain*	3.3% [3.0% - 3.7%]	7.9% [7.5% - 8.2%]	5.4% [5.0% - 5.8%]	13.9% [13.5% - 14.3%]	18.0% [17.1% - 18.8%]	51.5% [50.7% - 52.6%]
Sweden	5.9% [4.3% - 7.7%]	15.1% [12.4% - 17.6%]	8.6% [6.7% - 10.7%]	18.9% [16.2% - 21.6%]	16.0% [13.3% - 18.8%]	35.5% [32.0% - 39.1%]
Switzerland	5.8% [3.0% - 9.0%]	10.6% [7.0% - 14.4%]	7.9% [4.8% - 11.3%]	15.2% [10.6% - 19.9%]	18.5% [13.6% - 23.4%]	41.9% [36.1% - 47.9%]
Tajikistan	3.4% [0.7% - 6.4%]	9.8% [5.2% - 14.6%]	5.4% [2.2% - 9.3%]	16.0% [10.1% - 22.4%]	17.6% [11.9% - 23.4%]	47.8% [40.2% - 55.6%]
Turkey	2.7% [2.2% - 3.2%]	11.8% [10.8% - 12.7%]	4.3% [3.7% - 4.9%]	17.2% [16.1% - 18.3%]	15.4% [14.4% - 16.5%]	48.6% [47.2% - 50.0%]
Ukraine	2.3% [1.7% - 2.8%]	10.2% [9.2% - 11.4%]	4.1% [3.4% - 4.9%]	17.1% [15.7% - 18.5%]	12.6% [11.4% - 13.9%]	53.7% [51.8% - 55.5%]
<b>Country</b>	<b>Maternal 0-4</b>	<b>Paternal 0-4</b>	<b>Maternal 5-9</b>	<b>Paternal 5-9</b>	<b>Maternal 10-17</b>	<b>Paternal 10-17</b>
Uzbekistan	4.2% [1.7% - 7.0%]	16.6% [12.1% - 21.6%]	5.7% [2.5% - 9.1%]	19.8% [14.7% - 24.9%]	14.4% [9.9% - 19.1%]	39.4% [32.8% - 45.8%]
<b>South-East Pacific</b>						
Bangladesh	3.4% [2.9% - 4.0%]	13.8% [12.8% - 14.8%]	5.2% [4.5% - 5.8%]	18.6% [17.4% - 19.7%]	15.7% [14.8% - 16.7%]	43.3% [41.9% - 44.6%]
Bhutan	5.3% [0.0% - 100.0%]	24.8% [0.0% - 100.0%]	6.1% [0.0% - 100.0%]	21.6% [0.0% - 100.0%]	16.9% [0.0% - 100.0%]	25.4% [0.0% - 100.0%]
India*	2.7% [2.6% - 2.8%]	11.2% [11.1% - 11.4%]	4.2% [4.0% - 4.3%]	17.0% [16.8% - 17.2%]	15.2% [15.0% - 15.4%]	49.8% [49.5% - 50.0%]
Indonesia	2.1% [1.9% - 2.3%]	8.5% [8.2% - 8.8%]	3.6% [3.4% - 3.9%]	14.8% [14.4% - 15.2%]	16.0% [15.6% - 16.5%]	54.9% [54.4% - 55.5%]
Maldives	7.1% [0.0% - 17.9%]	21.8% [7.1% - 36.9%]	8.9% [0.0% - 19.4%]	20.4% [7.9% - 34.4%]	14.8% [4.1% - 28.2%]	27.0% [12.9% - 43.5%]
Myanmar	2.4% [1.9% - 2.9%]	9.0% [8.1% - 9.8%]	4.0% [3.4% - 4.6%]	15.2% [14.1% - 16.3%]	16.2% [15.1% - 17.3%]	53.2% [51.8% - 54.8%]
Nepal	3.7% [2.7% - 4.7%]	12.9% [11.1% - 14.8%]	5.6% [4.5% - 6.9%]	17.7% [15.8% - 19.8%]	18.4% [16.3% - 20.4%]	41.7% [39.2% - 44.2%]
Sri Lanka	2.3% [1.8% - 2.8%]	11.5% [10.3% - 12.6%]	3.9% [3.3% - 4.6%]	17.5% [16.2% - 18.6%]	14.3% [13.2% - 15.5%]	50.5% [49.0% - 52.2%]
Thailand	1.5% [0.8% - 2.3%]	9.3% [7.5% - 11.0%]	2.6% [1.6% - 3.6%]	15.8% [13.4% - 18.1%]	11.0% [9.1% - 13.1%]	59.9% [56.8% - 63.0%]
Timor-Leste	2.3% [0.4% - 4.9%]	4.3% [1.8% - 7.4%]	3.7% [1.4% - 6.3%]	11.5% [7.1% - 16.0%]	15.1% [9.9% - 20.0%]	63.1% [56.1% - 69.9%]
<b>Western Pacific</b>						

Australia	5.3% [2.4% - 8.4%]	12.7% [8.3% - 17.3%]	7.9% [4.2% - 12.0%]	17.3% [12.4% - 22.6%]	17.7% [12.8% - 23.0%]	39.2% [32.1% - 46.1%]
Brunei Darussalam	5.4% [0.0% - 22.3%]	14.3% [0.0% - 40.0%]	6.8% [0.0% - 25.0%]	17.4% [0.0% - 44.5%]	16.5% [0.0% - 40.1%]	39.6% [11.1% - 70.0%]
Cambodia	3.9% [2.9% - 4.9%]	13.2% [11.4% - 15.0%]	5.9% [4.7% - 7.2%]	18.2% [16.0% - 20.2%]	16.4% [14.4% - 18.2%]	42.5% [40.0% - 45.1%]
China	1.8% [0.7% - 3.1%]	10.0% [7.5% - 12.8%]	3.0% [1.6% - 4.6%]	16.4% [13.2% - 19.9%]	10.7% [8.1% - 13.5%]	58.1% [53.3% - 62.4%]
Fiji	3.0% [1.5% - 4.6%]	16.9% [13.5% - 20.5%]	5.1% [3.2% - 6.8%]	20.2% [16.8% - 23.6%]	13.8% [11.0% - 16.7%]	41.1% [37.0% - 45.3%]
Japan	5.7% [3.9% - 7.6%]	14.8% [12.2% - 17.6%]	8.9% [6.7% - 11.2%]	19.7% [16.9% - 22.6%]	15.8% [13.3% - 18.7%]	35.1% [31.5% - 38.5%]
Lao People's Democratic Republic	4.1% [0.0% - 11.8%]	13.2% [3.0% - 25.0%]	5.8% [0.0% - 14.3%]	18.2% [5.9% - 30.7%]	17.1% [6.3% - 29.1%]	41.6% [26.6% - 56.8%]
Malaysia	3.6% [3.0% - 4.2%]	9.7% [8.8% - 10.6%]	5.3% [4.6% - 6.1%]	15.6% [14.5% - 16.8%]	17.9% [16.7% - 19.0%]	48.0% [46.4% - 49.5%]
Mongolia	2.0% [1.3% - 2.8%]	4.1% [3.1% - 5.2%]	3.8% [2.8% - 4.9%]	10.1% [8.5% - 11.7%]	18.1% [16.0% - 20.2%]	61.9% [59.2% - 64.5%]
New Zealand	4.2% [0.0% - 33.4%]	14.7% [0.0% - 60.0%]	6.8% [0.0% - 33.5%]	18.3% [0.0% - 60.0%]	15.7% [0.0% - 60.0%]	40.3% [0.0% - 83.4%]
Papua New Guinea	3.3% [2.0% - 4.8%]	11.4% [9.0% - 14.0%]	5.1% [3.4% - 7.1%]	17.2% [14.3% - 20.3%]	16.9% [13.9% - 20.0%]	46.1% [41.9% - 50.1%]
Philippines*	6.0% [5.7% - 6.2%]	8.7% [8.5% - 9.0%]	9.8% [9.5% - 10.1%]	13.8% [13.5% - 14.1%]	26.5% [25.9% - 27.1%]	35.2% [34.6% - 35.8%]
Republic of Korea	1.5% [0.0% - 5.4%]	5.3% [0.0% - 11.8%]	2.8% [0.0% - 7.7%]	11.7% [4.2% - 20.5%]	13.6% [5.2% - 22.9%]	65.1% [51.7% - 77.2%]
Singapore	4.9% [0.0% - 18.2%]	12.9% [0.0% - 33.4%]	6.9% [0.0% - 23.6%]	16.5% [0.0% - 41.7%]	18.5% [0.0% - 41.7%]	40.3% [13.3% - 71.5%]
<b>Country</b>	<b>Maternal 0-4</b>	<b>Paternal 0-4</b>	<b>Maternal 5-9</b>	<b>Paternal 5-9</b>	<b>Maternal 10-17</b>	<b>Paternal 10-17</b>
Vanuatu	2.8% [0.0% - 50.0%]	8.6% [0.0% - 50.0%]	4.4% [0.0% - 50.0%]	13.7% [0.0% - 50.0%]	20.1% [0.0% - 100.0%]	50.5% [0.0% - 100.0%]
Viet Nam	2.6% [2.1% - 3.1%]	9.4% [8.6% - 10.4%]	4.1% [3.4% - 4.6%]	15.8% [14.8% - 16.9%]	14.5% [13.5% - 15.5%]	53.7% [52.1% - 55.1%]

\* Denotes one of 20 study countries.

Appendix 2  
Modeling methods



## Minimum estimates for 21 study countries

This report is based on the papers published in the Lancet Online First, July 20, 2021, by the Global Reference Group on Children Affected by COVID-19 (Hillis et al.)<sup>3</sup>. The paper and this linked Report use methods similar to Lotka et al.<sup>12</sup> and those used by the UNAIDS Reference Group for estimating AIDS orphanhood, to estimate COVID-19-associated orphanhood<sup>13</sup>. Hillis et al.<sup>3</sup> incorporates deaths of co-residing grandparents ages 60-84 years because they assume grandparents help provide some type of relational, practical, or financial caregiving for grandchildren with whom they share a home.

Minimum estimates of pandemic-associated orphanhood and caregiver deaths using excess mortality and COVID-19 mortality were calculated for 21 countries (Argentina, Brazil, Colombia, England & Wales, France, Germany, India, Islamic Republic (I.R.) of Iran, Italy, Kenya, Malawi, Mexico, Nigeria, Peru, Philippines, Poland, Russian Federation, South Africa, Spain, U.S.A., and Zimbabwe), which accounted for 77% of global COVID-19 deaths during 2020.

**Mortality.** Excess deaths and COVID-19 deaths were extracted for March 1, 2020–April 30, 2021, using 5-year age bands, or the level of disaggregation provided<sup>10</sup>. For countries reporting COVID-19 and excess deaths, larger value between the COVID-19 and excess deaths per age band was calculated so all orphans associated with the pandemic could be calculated.

**Fertility Rates.** Fertility rates at the same disaggregation level as deaths (5-year age bands) for the years children ages <18-years-old were born (2003 – 2020) were extracted and adjusted for child mortality where necessary<sup>3</sup>. Fertility rates for women over age 50 were assumed to be zero but data for men was used up to age 80. In the UK, country-specific data was available for both men and women; for countries included in the Demographic and Health Survey data, the own-child method was used to calculate male and female fertility, and for all other countries, UN World Prospects were used for female fertility rates and male fertility rates were calculated using UN Statistics Division data on men's fertility and fatherhood, alongside population estimates<sup>14</sup>.

**Paternal, Maternal, or Double Orphans.** The average number of children aged <18 years that each adult had was calculated by summing the average number of children born to a man or woman over each of the past 17 years, for the age they were that year<sup>3</sup>. The average number of children was then multiplied by the number of male and female deaths in corresponding parental age bands. These were then adjusted for possible clustering of deaths between parents using an estimate of secondary attack rates and infection fatality ratio.

**COVID-19-associated deaths in Co-residing Grandparents.** Two UN Population Division measures of household composition<sup>15</sup> were used to calculate associated deaths in co-residing grandparents:

1. Custodial grandparents: prevalence of skip-generation grandparents, defined as aged 60-84 years who lived with their grandchildren in absence of parents.

2. Other co-residing grandparents (or kin): prevalence of grandparents ages 60–84 years (or other co-residing kin ages 60-84, e.g., aunts or uncles) who lived in multi-generation households with >one family member ages 0–17, along with parent(s).

Deaths were truncated at 85 to produce a conservative estimate, which was then adjusted to avoid over-counting children who lost both parents and grandparents.

### **Global extrapolation of minimum estimates of COVID-19-associated orphanhood and caregiver loss**

Global extrapolations for the impact of COVID-19-associated deaths were developed from the 21 study country data that relied on the high correlation between total fertility rate (TFR) and the ratio of orphans to deaths (Pearson  $r^2 = 0.9310$ ). A logistic model was fit using least squares to estimate the two logistic parameters and gamma, a scaling parameter. Original methods were updated to include a Western European fixed effect to improve the fit to Western Europe<sup>1</sup>. Collated COVID-19 deaths from each country from Johns Hopkins University was used alongside TFRs from the UN Population Division World Prospects data<sup>14</sup>.

#### **Orphanhood age and circumstance estimates**

Fertility and mortality data was also used to estimate age of child and if a mother or father died. Due to incomplete fertility data for 2021, we assume the same fertility pattern for deaths in 2021 as in 2020. Only 20 study countries were included here since the Russian Federation did not have sufficient data. For each country in our study, the expected number of children an adult of each age and gender would have each year was estimated. Again, we adjusted the expected births for child mortality based on UN estimates of national survival rates.

The age-composition-specific numbers of children orphaned were calculated by multiplying the average number of children born each year to parents of different genders and ages with the number of COVID-19 associated deaths in each age and gender category. We summed over age and gender of parent to obtain the number of children in our six categories: 0-4 mother died, 0-4 father died, 5-9 mother died, 5-9 father died, 10-17 mother died and 10-17 father died, to inform age-and-stage programming for children. No adjustment for double orphans was made because the percentage was negligible.

#### **Extrapolation of orphanhood age and circumstance estimates**

Bayesian multinomial logistic regression was used to estimate the global, WHO regional, and national composition of orphanhood. A model was fit using the numbers of orphans in the six categories as the outcome variable for the 20 study countries, and the proportion of the total population ages 15-44, 45-64 and 65+ and the most recent per capita gross domestic product (GDP) as the predictor variables.

This model was then used to predict the age-by-circumstance composition of orphanhood in all countries in the world that have reported COVID-19 deaths according to Johns Hopkins University using Monte Carlo sampling. For each of our 1000 samples calculated using the country specific extrapolation described above, one draw was sampled from the posterior of the multinomial regression with the sample size for each country set to the country specific estimate of orphanhood. Means of these country specific numbers are reported.

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