

Assessing the impact of Covid-19 on Nurturing Care in Nairobi Slums: Findings from 5 rounds of cross-sectional telephone surveys

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23 Abstract

24 **Introduction:** This study investigates the multifaceted impacts of the Covid-19 pandemic on early
 25 childhood in three of Nairobi's informal settlements or slums. Focusing on the first five years of life, a
 26 critical period for human capital development, we analyse how Nurturing Care across five domains
 27 (Health, Nutrition, Responsive Caring, Early Learning, Security and Safety) was influenced by the
 28 pandemic and the mitigation measures that were implemented.

29 **Methods:** Using a longitudinal design, we conducted five rounds of cross-sectional surveys (with between
 30 578 and 774 respondents in each) over 13 months, correlating with different phases of the pandemic and
 31 varying levels of Covid-19 restrictions.

32 **Results:** Our findings reveal significant disruptions in healthcare services, particularly pronounced in early
 33 rounds with missed vaccinations (reported by 1 in 5 parents of infants) and therapeutic healthcare
 34 seeking (missed by up to 21% of families). The study also highlights persistent food and nutrition
 35 insecurity, with a large majority of families struggling to feed their children (up to 72% in Round 1) due to
 36 financial constraints. Economic shocks were near-universal, with widespread losses in income and
 37 employment reported; 99.7% of respondents reporting earning less since the start of the pandemic. The
 38 use of paid childcare initially plummeted but showed a resurgence over time (up to 21% usage by Round
 39 5) as the pandemic and control measures evolved. Young children were commonly left alone in all
 40 rounds, but especially earlier in the pandemic; 24% in Round 1, and at least 13% in all rounds,
 41 underscoring the enduring challenges in providing consistent nurturing care in these settings. Very few
 42 (less than 2%) of study participants reported direct experience of Covid-19 in their family in any round.

43 **Conclusion:** Despite adaptations over time and the decrease in reported disruptions, the prolonged
 44 economic shock was associated with multiple adverse effects Nurturing Care. The study's longitudinal
 45 scope provides insights into the dynamic nature of ensuring young children in slums thrive during crises,
 46 highlighting the need for tailored interventions and policies that address the compounded vulnerabilities
 47 of young children in these communities.

48 [342 words]

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51 1. Introduction

52 Early childhood development (ECD), by which we refer to the first five years of a child's life, is central to
 53 setting a child's developmental trajectory. In recognition that this period is a critical one for accumulation
 54 or loss of human capital the early years have received increasing attention from policy makers (1),
 55 funders (2,3) and academics(4) in recent years. This culminated in the launch of the Nurturing Care
 56 Framework by the WHO/UNICEF and World Bank in 2018(1).

57 However, there is limited published literature on ECD in urban areas, particularly in slums or informal
 58 settlements¹, despite the rapid growth of these settings. In particular, little is known about either the
 59 provider of care, or what care is provided to young children(5). In addition, the SARS-Cov-2 pandemic
 60 from 2020 led to radical disruption of early childhood in almost every country around the world due to
 61 both the direct and the indirect effects of the virus and efforts to control it(6). While there has been
 62 considerable emphasis and research into the effects of the pandemic on health systems and services (7),
 63 there has been little work on early childhood specifically, especially in low- and middle-income countries
 64 where resilience to shocks may be most limited(8).

65 We therefore aimed to track over time how the care of young children in three slums in Nairobi was
 66 affected by the pandemic and efforts to control it. We aimed to estimate impacts across all five
 67 components of Nurturing Care (Health, Nutrition, Responsive Caring, Early Learning and Security and
 68 Safety) alongside cross-cutting impacts(for example household economic impacts) during a year of the

¹ In this paper we have largely adopted the approach and terminology as used in the *Lancet* series on 'The health of people who live in slums', which defines the term 'slums' as distinct from 'informal urban areas' based on neighbourhood effects, many of which seem relevant to the discussion around childcare(4). Nevertheless, our experience is that the terms 'slum' and 'informal urban areas' are often used somewhat interchangeably, and at times we have used both terms.

pandemic. This study is nested within the broader Nairobi Early Childhood Care in Slums (NECS) study, a detailed mixed-methods exploration of the care of children in Nairobi slums(9).

Our key pre-study hypotheses were: firstly, that the evolving Covid-19 pandemic would be likely to impact on Nurturing Care in slums, and that these impacts would be felt across multiple domains. Secondly, we hypothesised that these impacts may evolve over time, in relation to both Covid-19 case incidence and the stringency of epidemic control measures in force.

2. Methods

2.1. Setting

The setting for the study was three slums in Nairobi, Kenya: Kibera; Mukuru-Viwandani; and Kawangware. These slums are characterized by high levels of poverty, poor sanitation, inadequate shelter, poor infrastructure, high levels of insecurity, and low rates of formal employment(10,11). These slums were selected for several reasons: firstly, these characteristics meant that they represented a particularly vulnerable group; secondly, because of access to a pre-existing database of residents who had consented to being contacted for surveys (described further in section 2.6); and thirdly, to overlap with the wider Nairobi Early Childcare in Slums Study (NECS)(9).

2.2 Study design

Five rounds of cross-sectional surveys were undertaken through computer-assisted telephone interviews (CATI). Participants were parents of children aged under five years selected from a pre-existing database of around 48,000 low-income household contacts living in three Nairobi slums (Kibera (c. 25,000 contacts), Kawangware (c. 13,000 contacts) and Mukuru-Viwandani (c. 10,000 contacts). These were people who had previously participated in surveys/field experiments conducted by the non-profit research firm BUSARA(12) and who had consented to being invited to participate in future studies. These potential participants were initially recruited door-to-door by field assistants.

92 The first round of data collection was from 10 to 29 November 2020, which corresponded with the peak
 93 of Kenya's second wave of recorded Covid-19 infections. Rounds 2-5 were all in 2021 (Round 2: data 9-29
 94 March; Round 3: 6-25 June; Round 4: 6 September -1 October; Round 5: 29 November-13 December).
 95 Table 1 summarises the prevailing Covid-19 epidemiology and controls in place at the time of each round
 96 of data collection.

97 **Table 1 – The context for each survey round**

Round	1	2	3	4	5
Data collection dates:	10 th -29 th November 2020	9 th -29 th March 2021	6 th -25 th June 2021	6 th September-1 st October 2021	29 th November-13 th December 2021
Season	<i>Short rains</i>	<i>Start of long rains</i>	<i>Dry – start of cold season</i>	<i>Start of short rains</i>	<i>End of short rains</i>
Summary of covid epidemiology at the time – narrative; overall trend in epidemiology	<i>This period coincided with the peak of Kenya's second wave of recorded Covid-19 infections, which peaked in mid-November ². Towards the end of the data collection period cases had begun to fall.</i>	<i>A period of high growth in recorded Covid-19 case; during this period the Kenya's third wave of infections was emerging. The wave peaked towards the end of this round of data collection.</i>	<i>A period of relatively low Covid-19 cases compared to previous rounds, albeit with some growth in recorded cases after the data collection period.</i>	<i>A period of falling Covid-19 cases, after the peak, in mid-August, of the country's fourth wave.</i>	<i>Very low levels of cases of Covid-19 recorded, the lowest since the start of the pandemic. Towards the end of the data collection period some rise in cases which turned out to be the start of the fifth wave in Kenya.</i>
Mean daily covid cases (across data collection period) . ³	1021	1074	518	388	97
Range in daily cases	413-1459	431-2008	161 - 796	54 - 704	28 - 202
Covid control measures in place:					
Curfew	Yes – 10pm-4am	Yes – 8pm-4am	Yes – 8pm-4am	Yes – 10pm-4am	No
Ban on gatherings	Yes – all types	Yes – all types	Yes – all types	Limited – no more than 15, except weddings and funerals (up to 100)	Unrestricted
Public messaging	<i>"No Mask, No service"</i>	<i>"Work from home if you can"</i>	<i>"Work from home if you can"</i>	<i>"Mask mandatory in public places"</i>	<i>"Return to normal"</i>
Closure of hospitality	<i>"Stay at home"</i>			<i>"Get vaccinated"</i>	
Schools	Yes	Yes	Yes	Partial	No
	<i>Mostly closed – staggered re-opening for some grades</i>	<i>Partially closed – exam grades in school for delayed exams</i>	<i>Open for all grades</i>	<i>Open for all grades</i>	<i>Open for all grades</i>
Covid vaccination rollout	<i>No vaccine available</i>	<i>Vaccine rollout being planned, but not yet rolling out.</i>	<i>Mass vaccination programme rolled out, around about one million vaccinated.</i>	<i>Mass vaccination campaign ongoing; 3.8 m people have received at least one dose.</i>	<i>5 million people have received at least one dose, 3.3m have received two doses; Proportion of adults fully vaccinated was 12.0%.</i>
Covid stringency Index ⁴ – mean (range)	51.9 (51.85-51.85)	52.7 (50.93-64.35)	66.2 (65.74-74.07)	56.0 (56.02-56.02)	41.4 (41.33-41.39)

²<https://www.health.go.ke/wp-content/uploads/2020/11/NERC-MOH-CS-COVID-RELEASE-15.11.2020e-2.pdf>

³Data obtained from the Ministry of Health official website <https://www.health.go.ke/press-releases/>

⁴ See [COVID-19 Government Response Tracker | Blavatnik School of Government \(ox.ac.uk\)](#)

2.3 Sampling and recruitment

Survey respondents were selected randomly from the BUSARA database. The recruitment procedure was as follows:

1. A randomly ordered list of potentially eligible respondents was identified based on their being resident in the three slum areas (52% of these were from Kibera, 27% Kawangware, and 21% from Mukuru-Viwandani);
2. An SMS message was sent briefly introducing the research and informing them that they would be called.
3. An eligibility check telephone call was completed, during which, if eligible and interested, the background and rationale for the study were explained, followed by a clear and explicit consent process. This was followed by either immediate completion of survey, or a further scheduled callback at convenient time

Up to five call attempts were made to reach each potential participant each round, at a variety of times during the day. When surveys were interrupted by a dropped call or other interruption, up to five attempts were made to complete the survey over the following days.

Steps 2-3 were repeated in each subsequent round of data collection. If a round was missed, respondents remained in the study, and the same procedures applied in each subsequent round.

Figure 1: Graph illustrating timing of data collection in relation to 7-day rolling average numbers of confirmed Covid-19 cases in Kenya

2.4 Respondent eligibility criteria

Respondents were eligible to participate in the study if they: (i) were 18 years or older; (ii) had a child aged under 5 years old living in their households (or who lived there at some point in the year 2020; in order to avoid excluding children who had moved out of the city due to the pandemic); (iii) were resident in the study setting. In addition, individuals needed to have provided consent to BUSARA within the last 5 years to be contacted with invitations for future research studies.

2.5 Data collection

Data were collected by enumerators working for the non-profit research firm BUSARA(12) who had expertise in public health and epidemiology research. The SurveyCTO(13) platform was used for digital data collection which was used to guide call-center operators, (who were experienced in survey work), through the survey questions in Kiswahili. Enumerators had been trained for a total of 12 hours before the start of data collection. They worked from home (due to Covid-19 control measures) with daily check-in video call meetings with supervisors. Data quality was managed through enumerator training and pre-testing, automated range and consistency checks, manual checks on a sample of the data, debriefings, and refresher training. Survey interviews were digitally audio recorded for quality checks (conducted by supervisors on 10% of total surveys in each round).

2.6 Survey content

138 The survey consisted of a set of mostly closed questions. The survey questions were derived from a
139 previously developed conceptual framework and draft household survey tool for the Nairobi Early Childcare
140 in Slums Study(9), supplemented with additional questions aiming to identify the direct and indirect impacts
141 of the Covid-19 pandemic on young children and their families.

142 Questions covered the following domains:

- 143 ▪ Respondent characteristics and survey eligibility
- 144 ▪ Child characteristics, including age, and reported sensory or mobility difficulties
- 145 ▪ Who was looking after their youngest child, for even a few minutes and for >1 hour in the previous
146 three days.
- 147 ▪ Additional questions about the usage frequency and costs of paid childcare amongst those reporting
148 using it
- 149 ▪ The Family Care Indicators (FCI) questions about daily activities(14)
- 150 ▪ Disruptions to healthcare services or care seeking
- 151 ▪ Food and nutrition security, including impacts on breastfeeding
- 152 ▪ Perceptions of community safety and security and reports of violence against children
- 153 ▪ Levels of concern about the pandemic
- 154 ▪ Economic impacts of the pandemic, including loss of work or income
- 155 ▪ Help received
- 156 ▪ Household assets (only the first time respondents took part)

157 Where there was more than one child in the house, respondents were asked to focus on the youngest child
158 in the household.

159 **Error! Reference source not found.** includes the full survey instruments for Round 1 and Rounds 2-5, noting
160 the minor changes that were added following review of Round 1 data quality and free text 'other' answers.

2.7 Sample size:

In Round 1 we planned to recruit an initial 600 participants, allowing for a 20% loss to follow up, with the aim of achieving 480 participants who were followed throughout the study. This was calculated in order to yield estimates of the type of childcare used with precisions of at most +/- 5% including a 25% adjustment for clustering. In practice, we oversampled (by 174, to a total of 774 responses) in Round 1, to allow for higher levels of loss to follow up. In Rounds 2-5, new respondents were recruited following the same procedures as in Round 1.

2.8 Data Analysis:

Data were analysed using STATA 18(15) and Microsoft Excel365(16). Descriptive summary statistics were calculated to describe the samples for each round and changes between rounds. The frequency of reported impacts across all domains of Nurturing Care and cross-cutting impacts was reported with some indicators (breastfeeding problems, the use of childcare, FCI indicators and children left alone) disaggregated by age of child. Only fully completed surveys were included in the final dataset. A principal component analysis (PCA) was conducted based on a list of 21 reported household assets to generate socio-economic status (SES) quintiles for each unique respondent. Only surveys that were completed fully were shared by BUSARA; i.e. there were no missing data in the dataset we received.

Additional information on Covid-19 epidemiology (drawn from WHO Data Dashboards(17)) and Covid-19 control measures (taken from both the Kenyan Ministry of Health Website(18) and the Oxford Covid Policy Tracker(19)) was collated for use in analyses and interpretation of the survey data.

2.9 Public involvement:

During the design and inception phase for the wider NECS Study (in February 2020), public engagement meetings were held with community-based organisations in Mukuru-Viwandani. These meetings provided an opportunity to discuss the research methods and questions with the local community, including the planned household survey that informed these telephone surveys. Pre-study visits to the study site allowed for initial discussions about the research questions with parents, childcare providers, and other community members. During preparation of this manuscript emerging draft findings were shared in a community meeting in Nairobi in March 2022, where these findings were discussed with community members, with a focus on implications of the research for local planning and policy making.

2.10 Ethics:

Informed verbal consent was obtained from all respondents and was recorded for audit purposes. The consent process included provision of information about the purpose of the study, confidentiality, how data would be used and shared, and the right to withdraw consent at any time. Participants who completed a survey round received KES150 (equivalent to US\$1.5) for each round of survey completed to compensate them for their costs of participation). The LSHTM Research Ethics Committee (LSHTM Ref: 22692) and Amref Health Africa's Ethics and Scientific Review Committees (ESRC) in Kenya (Ref: P777/2020) reviewed and approved the study protocol. The National Commission for Science, Technology and Innovation (NACOSTI) provided research clearance. The consent script and anticipated 'frequently asked questions' are included in

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2.11 Role of the funders:

The NECS Study was funded by The British Academy (Grant ECE190134) and Echidna Giving who supported a linked Clinical Research Fellowship for RCH. Echidna Giving also provided a 'Covid Response' grant for additional costs associated with the Covid-impacts tracker study that is reported on in this manuscript. The funders had no role in the study design, data collection, data analysis, data interpretation, or writing of the

207 paper. The corresponding author had full access to all the data in the study and had final responsibility for
208 the decision to submit for publication.

209

210 **3 Results**

211 **3.1 Survey and respondent characteristics by round**

212 A total of 1077 participants completed at least one round (774 respondents in R1, 664 in R2, 594 in R3, 528 in
213 R4 and 642 in R5). The flow between rounds is illustrated in **Error! Reference source not found.**, which
214 shows that 774 entered the study at R1; 122 at R2, 58 at R3, 62 at R4, 61 at R5, and that most loss to follow
215 up occurred between R1 and R2. 279 respondents completed all 5 rounds (197 completed 4 rounds; 131
216 three rounds; 134 two rounds; 336 one round) (Supplementary Table 2).

217 The median duration of interviews in R1 was 27 minutes, which increased to 34 minutes in R2 (when
218 additional questions were added), and then reduced to 23, 20 and then 17 mins in subsequent rounds (as the
219 number of new recruits fell and familiarity with the questions increased⁵). Most respondents were
220 interviewed on the first call attempt (86-95% in R2-5; data on the number of call attempts was not retained
221 by BUSARA in R1) (Supplementary Table 1).

222 Table 2 summarises the respondent characteristics by round. Respondents were mostly mothers (52%),
223 fathers (35%) or grandmothers (8%) (see Supplementary Table 3). The mean age of survey respondents was
224 similar across rounds (Range across rounds: 32.0 to 33.8 years old), as was the percent educated to 18 years
225 old or more (Range: 28.3% to 33.4%). Similarly, the proportion of respondents in the lowest socio-economic
226 quintile was consistent across rounds (Range: 20.5% to 17.4%).

⁵ Questions about household assets were only asked in the first round that a respondent took part in.

In each round 8.7 to 10.1% of respondents reported that the youngest child had a problem with at least one of seeing, hearing, moving or communicating. Problems seeing were most common, followed by communicating and moving (see Supplementary Table 4).

Table 2 – Survey Respondent Characteristics by Round

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Round	1	2	3	4	5
n=	774	664	594	528	642
Of whom newly recruited	774	122	58	62	61
Age of survey respondent (yrs): Mean	32.0	32.9	33.2	33.0	33.8
Median	31	31	32	32	32
Range	19-67	19-67	20-56	19-67	18-88
% educated to age 18yrs+	_* ⁶	33.4%	32.9%	32.3%	28.3%
n	*	222	196	171	182
Mean age of participant's youngest child (months):	21.0 ⁷				
		31.3	28.5	31.3	31.5
Inter-quartile range of ages of youngest child: (SD)	30 (18.3)	35 (22.0)	29 (21.6)	30 (21.6)	30 (19.6)
SES Status –					
% in lowest quintile	20.5	18.1	18.5	17.4	18.2
Reported disabilities: % parents report their youngest child having a problem with any of: seeing; hearing; moving; communicating	8.9%	9.3%	10.1%	9.6%	8.7%
n	69	62	60	51	56

⁶ This question was asked differently after Round 1, as there appeared to be some confusion in how to responded (Participants were asked how many years of schooling they had completed, but frequently reported the age that they left education)

⁷ In Round 1, insufficient range checks and age verification questions were in place in the survey instrument; something that was corrected in subsequent rounds. This number is therefore reported, but may need to be interpreted with caution.

237 Table 3A summarises the reported impacts in each round across the domains of Nurturing Care.

238 **3.2.1 Health**

239 Significant disruptions were reported to a broad set of health services in early survey rounds, and although
240 disruptions continued, there was a reduction in the reported incidence over time. In R1, when asked about
241 disruptions to health services since the start of the pandemic in Kenya, the most frequently reported missed
242 or delayed services was child growth monitoring (reported to have been missed/delayed by 28.8% of
243 respondents) followed by missed vaccination appointments (which was reported for 19.7% of children aged
244 under 12 months old) and seeking care for an unwell child (21.2% reported missing this, across all ages of
245 child). In R1 8.7% of parents/carers reported a missed or delayed antenatal appointment since the start of
246 the pandemic in R1.

247 In subsequent rounds, respondents were asked about disruptions in the previous 30 days. Across these
248 rounds, there is a largely consistent pattern of declining levels of reported disruption round to round. By R5,
249 7.0% reported having missed/delayed a growth monitoring appointment, 6.1% delaying/avoiding seeking
250 care for an unwell child, and 5.1% having missed a family planning appointment, and 1.6% an antenatal
251 appointment. Only 2.3% of respondents with a youngest child aged under 12 months reported having missed
252 a vaccination appointment in the last 30 days by R5.

253 **3.2.2 Nutrition**

254 A high proportion of respondents reported problems feeding their child/children in all rounds (R1: 72.1%, R2-
255 5 46.1-52.1%). A large majority of these reported that this was because of having insufficient money (68.9%
256 of respondents reported this in R1), with a much smaller proportion citing being afraid to go out (2.8%) as
257 the reason for their difficulties. Few if any respondents reported food being unavailable locally in any round
258 (0%-0.8%). Amongst respondents with children aged under 24 months, breastfeeding problems were cited by
259 11.3% in R1, and between 1.6% and 9.6% in subsequent rounds, with no clear trend in over time.

260 In R2-5 questions from the Food Insecurity Experience Scale (FIES)(20) were included in the survey. In R2,
261 83% of respondents reported having skipped a meal and 44% reported having not eaten for a whole day due
262 to a lack of money/resources. Reported indicators of food insecurity remained high but dropped slightly in
263 subsequent rounds. By R5, 77% reported having skipped a meal and 38% reported having not eaten for a
264 whole day.

		ROUND	1	2	3	4	5
CATEGORY	Question	n	774	664	595	529	642
A – NURTURING CARE DOMAINS							
HEALTH	Missed/delayed...						
	...vaccination appointment...	% parents/carers of <12m	19.7				
	...since start of pandemic^.						
	...in past 30 days	% parents/carers of <12m	-	13.3	7.9	6.3	2.2
	...growth monitoring...	%	28.8	-	-	-	-
	...since start of pandemic.						
	...in past 30 days.	%	-	17.0	13.6	7.6	7.0
	...seeking healthcare for an unwell child...	%	21.2	-	-	-	-
	...since start of pandemic.						
	...in past 30 days.	%	-	10.7	6.9	7.6	6.1
	...antenatal appointment...						
	...since start of pandemic.	%	8.7	-	-	-	-
	...in past 30 days.	%	-	2.6	1.2	0.9	1.6
	...family planning appointment...						
	...in past 30 days.	%	-	5.9	5.4	4.5	5.1
NUTRITION	Are you facing any problems with feeding your child/children at the moment (either having enough to provide, or with physical feeding)?	% Yes	72.1	46.5	52.1	46.7	46.1
	% (of whole round sample) who report that this is because...						
	...we don’t have enough money.	%	68.9	38.8	46.4	42.5	43.5
	...I am scared to go out.	%	2.8	1.1	0.7	1.5	0.6
	...I don’t have a place to live.	%	0.3	0.8	0.2	0.0	0.0
	...I breastfeed, and I am having problems with breastfeeding	% of those w child <24m	11.3	5.3	1.6	9.6	9.5
	Household food security:						
	Reported skipping a meal because of a lack of money/resources in the last 30 days	% Yes	-	83.4	84.2	77.8	77.1
	Reported not eating for a whole day because of lack of money/resources in the last 30 days	% Yes	-	44.0	38.7	38.3	38.2
RESPONSIVE CAREGIVING							
PROVIDER	Used paid childcare in last 3 days	% Yes	1.6	17.6	19.4	18.2	21.2
	Used grandparent provided care		14.2	23.9	24.0	19.8	24.5
AFFECTION	Used sibling provided care		31.2	20.5	21.8	18.2	19.7
	Have you found it more difficult to be affectionate to [name] over the past 30 days?	% Yes	28.3	15.	13.0%	14.5	12.5
EARLY LEARNING/ EDUCATION: FAMILY CARE INDICATORS							
	In the past 3 days, did you or anyone else age 15 or over engage in any of the following activities with [name]?						
	Read books	% Yes	32.1	43.6	48.7	47.1	52.5
	Tell stories	% Yes	32.0	37.0	40.4	37.8	44.2
	Sing songs	% Yes	72.4	73.3	72.7	70.3	76.4
	Take outside	% Yes	50.6	67.0	68.0	71.3	68.0
	Name, count, draw	% Yes	39.9	54.3	53.0	55.0	60.4
	Play	% Yes	72.1	76.6	74.6	76.6	81.3
	How many children’s books or picture books do you have for [name]?	% with zero	54.6	38.9	47.5	44	42.2
		% with 0-5	96.5	94.5	97.8	95.6	96.7
		% with >5	3.5	5.5	2.3	4.4	3.3
SECURITY AND SAFETY							
NEGLECT	left alone for >1hr for on one or more days in last 7	%	23.5	19.3	12.7	14.9	13.7
	0-5m	%	15.8	17.2	2.6	13.6	2.9
	6-11m	%	15.5	15.9	11.5	13.5	15.8
	12-35m	%	25.0	21.4	13.3	13.7	12.4
	36-59m	%	28.7	18.5	12.5	13.0	11.2
	60m+	%	35.0	21.2	15.6	16.0	16.6
COMMUNITY SAFETY	Has there been any change to how safe, in terms of the risk of violence, your neighbourhood feels since [the start of the pandemic? (R1) in past 30 days? (R2)]						
	WORSENING		29.9	29.5	31.3	31.2	33.3
	NO CHANGE /unsure		24.1	37.0	43.7	44.2	44.2
	IMPROVEMENT		45.9	33.5	25.0	24.6	22.4
	“Do you think there has been any change in the amount of violence within households (domestic violence) in your community in the past month?” (R2+)						
	% Yes – violence increasing		-	25.6	26.4	24.4	22.4
	% No/don’t know		-	50.7	55.5	56.5	53.1
	% Yes –violence decreasing		-	23.8	18.2	19.1	24.5
	% Yes - increasing (female respondents)		-	25.8	24.6	22.7	22.2
B - CROSS-CUTTING IMPACTS							
	Has how [name of youngest child] spends their time changed...						
	...since Covid started to affect Kenya?	% ‘Yes’	63.4				
	...in the last 30 days?	% ‘Yes’		35.6	20.0	19.0	15.3
ECONOMIC EFFECTS	Has the type of work you do changed since Covid started to affect Kenya?	% reporting loss of job/work	80.3%				
	Have you lost your job, or changed your work in the past YEAR?	% Yes	-	60.6%	58.8%	45.4%	45.2%
	Have you lost your job, or changed your work in the past MONTH?	% Yes	-	24.7	22.0	16.5	16.8
	How has the amount of money you get changed since start of pandemic?	% reporting earning less	99.7	-	-	-	-
		% reporting earning more	0.1	-	-	-	-
	How has the amount of money you get changed in the past 30days?	% reporting earning less	-	85.4	86.3	80.4	83.8
		% reporting earning more	-	3.5	1.4	2.5	1.7
C - MORE DIRECT EFFECTS OF COVID:							
	"In the last 30 days, I or a family member have been unwell with COVID symptoms"		1.3	0.6	0.3	0.6	0.3
	Which of the following best describes how you feel about COVID-19?	% My biggest concern	50.1	36.4	39.7	44.2	38.0
		% Very concerned	36.9	40.3	42.2	32.5	29.9
		% Somewhat concerned	10.7	16.7	15.8	19.3	24.5
		% Not at all concerned	2.3	6.6	2.4	4.0	7.6
D - HELP RECEIVED							
	Proportion of sample reporting having received any help in the month before the survey round:	%	70.1	7.5	4.5	4.5	2.6

267 3.2.3 Responsive Care

268 In R1, only 1.6% of respondents reported having used paid childcare in the previous 3 days. In subsequent
269 rounds the levels of use of paid childcare increased considerably, for example to 17.6% in R2 and to 21.2% in
270 R5. Box 1 summarizes the frequency of use by age, hours and fees paid for childcare reported. Grandparent
271 provided care was common across all rounds, but was lowest in R1 (14.2%), and highest in R5 (24.5%). Sibling
272 provided care was common in R1 (28.3% reported using it) but declined to 12.5% use by R5.

273 When asked “Have you found it more difficult to be affectionate to [name] over the past 30 days?” 28.3%
274 said yes in R1, 15.6% in R2 and 12.5% by R5.

Box 1: Use of Paid Childcare

Figure 2 illustrates the probability of children of different ages using paid childcare in each round. Older children may have more commonly used childcare in early rounds. However, by R4-R5, other than uncommon childcare use amongst children >60m, the probability of children using childcare was similar across all other age groups.

Those who reported using paid childcare were additionally asked about how much it cost, which days it was used, and what hours it was reported to be used for. Most (67-87%) of childcare users in all rounds reported attending for 5 or more days each week (Supplementary table 5). The most common times for using paid childcare were mornings (77-88% of users each round) and afternoons (72-88%), with evening childcare also being frequently used (18-42% of users), but no respondents reporting using paid childcare overnight (Supplementary table 6). The average spend on childcare was similar across rounds, with the median being KES 50-70 (around 0.5 – 0.7 USD) in all rounds (the mean ranged from 67 KES in R4 to 82 KES in R1)(Supplementary table 7).

Figure 2: The probability of using paid childcare for each age group in each round

3.2.4 Early learning (and education)

The most commonly reported activities from the Family Care Indicators were playing, singing songs and (especially in subsequent rounds after R1) taking children outside: 72-81% of children were reported to have had a parent or someone over 15 years old playing with them in the previous 3 days; 70-76% reported to have sung songs; and although in R1 only 51% reported having taken their youngest outside in the previous 3 days, in R2-R5 67-71% reported having done so.

Figure 3 is a heatmap illustrating the percentages reporting each Family Care Indicator for each age group for each round. Some activities were reported more frequently with older children (reading, counting/naming/drawing, and telling stories) and singing was more common with younger children. It also appears that there was a modest increase over time in several activities that was not obviously age confounded.

Figure 3: Heatmap illustrating % of respondents reporting 'yes' to family care indicators by age

There were few books reported to be in the home; a high proportion of respondents in all rounds reported having no children's books or picture books (38.9%-54.6%); only 2.3-5.5% reported owning more than 5 books.

3.2.5 Security and Safety

In R1, 23.5% of respondents reported having left their child alone for more than an hour on at least 1 day in the past week. This reduced to 19.3% in R2, and 12.7%-14.9% in R3-5. Although the practice of leaving children alone seemed to be more common with older ages of children, the % of very young children (those aged under 6 months old) reported to be left alone was still high; up to 17% in R2 (Figure 4).

Figure 4: Heatmap of % of children reported to be left alone by age group and round.

Being left under the care of children was also common, with 44.9% reporting in R1 having left their youngest child under the care of someone aged under 15 years old for more than 1 hour in the past week. In R2, 47.1% reported leaving a child with an under 15-year-old, and 33.5% leaving them with an under 10-year-old. The frequency of being left under the care of a child declined from R1 to R3, and then remained relatively consistent, with 37.1% and 26.9% being left alone with an under 15-year-old and an under 10-year-old respectively by R5.

When asked about community safety "Has there been any change to how safe, in terms of the risk of violence, your neighbourhood feels [since the start of the pandemic – R1 / in the past 30 days – R2-5]?" a mixed picture emerged, and this evolved over time. Across all rounds, up to one third of respondents reported a worsening of community safety (range: 29.5%[R2] to 33.3%[R5]). However in earlier rounds a

317 large proportion (45.9% in R1, 33.5% in R2) of respondents suggested safety had improved. By R5, the largest
318 proportion (44.2%) reported that safety had stayed the same or 'Don't know'.

319 Reported violence towards young children was similar across rounds, ranging between 6.3% in R1 to 4.8% in
320 R4 responding 'Yes' to the question "In the past month, has anyone been angry or violent towards your
321 youngest child?". Amongst children under 2 years-old, the rate varied between 1.3% (R2) and 5.4% (R3)
322 across all 5 rounds.

323 In rounds 2-5, an additional question asked about perceptions of any change in household/domestic
324 violence; in all but R5, a slightly higher proportion of respondents suggested that domestic violence was
325 increasing (25.6%-24.4% R2-4), than suggested it was falling ((23.8% - 19.1% R2-R4). In all rounds around half
326 of respondents replied that it was not changing or 'Don't know'. Amongst female respondents (those
327 reporting their relationship to the child was one of being a mother, grandmother or aunt) the rates of
328 increased perceptions of domestic violence were similar to those in the whole sample (25.8%[R2] to
329 22.2%[R5]).

330 **4 Cross-cutting impacts**

331 Table 3B summarises reported cross-cutting impacts, including effects on how young children spent their
332 time and on household income and work. In R1, nearly two thirds (63.4%) reported that the pandemic had
333 led to a change in how their young child spent their time, with the top reported reasons for this being: the
334 closure of childcare; lack of money making childcare unaffordable; the impact of partial reopening of schools;
335 and reductions in contacts with peers/relatives. Over the course of survey rounds, there was a tendency
336 towards lower levels of reported disruption, with only 15.3% reporting a change in the past 30 days by R5,
337 compared to 35.6% reporting this in R2.

338 Economic impacts of the pandemic were reported to be widespread; in R1 80.3% reported a loss of
339 job/source of income since the start of the pandemic, and 99.7% of respondents reported earning less than

in the pre-pandemic period. When asked in subsequent rounds about change in the past 30 days between 80.4% and 86.3% continued to report a reduction in income each round. Very few respondents (0.1-3.5%) reported an increase in earnings in any round.

3.3 Reported incidence and concern about Covid-19

When asked about any other impacts of the pandemic, a small proportion of respondents, between 1.3% in R1 and 0.3% in R3, reported that they or a family member had been unwell with Covid-19 symptoms (Table 3C). Levels of concern about Covid-19 were very high initially (with 87% of respondents saying that Covid-19 was their “biggest concern” (50%) or that they were “very concerned” about it (37%)), and although this declined over the course of the data collection period, even by R5, 38% were still saying that Covid-19 was their biggest concern.

3.4 Help received

The proportion of people reporting having received any help was significantly higher in R1(70.1%) compared to R2 (7.5%) and later rounds, falling to 2.6% in R5. Most help was reported to have been received in the earlier time periods surveyed, and was in the form of being given information (reported to as received by 41.5% in R1), being given support for their mental wellbeing (for example someone sitting with you, talking with you), (28.8% in R1), and donations of masks (28.6% in R1).

4 Discussion

Principal findings: There are several notable features of the reported impacts of the pandemic on Nurturing Care in slums. Firstly, the impacts were broad in their extent, affecting all components of Nurturing Care. We show that healthcare was radically disrupted, especially earlier in the pandemic, for example with 1 in 5

363 families with a child aged under 12 months reporting having missed a childhood vaccination appointment in
364 R1, and a similar proportion (21%) of families of children aged up to five years reporting having missed or
365 delayed seeking healthcare for an unwell child since the start of the pandemic. We also identified high levels
366 of reported food and nutrition insecurity, including 4 in 10 respondents having not eaten for a whole day in
367 all the rounds where this question was asked. High levels of disruption to responsive caregiving were
368 reported, including the use of paid childcare which was reported by less than 2% of respondents in R1. It was
369 common for children, including very young children, to be left alone. This was especially the case earlier in
370 the pandemic (24% of children under 5 years and 16% of those aged under 6 months old were left alone for a
371 least one hour on at least one day in the past week in R1).

372 Secondly, there was considerable change in reported Nurturing Care over time as the pandemic and control
373 measures evolved from an initial strict 'lockdown' with closed schools and workplaces to a near-return to
374 normal by the final round of data collection. The most notable changes over this period were the return to
375 widespread use of paid childcare (which increased to more than 1 in 5 reporting using it by R5).
376 Parents/carers of even very young children used paid childcare regularly (usually for five or more days a
377 week), paying very low fees (commonly around KES50 or 0.5USD/day) to do so. We also found reductions in
378 the frequency of reported disruptions to healthcare over time (by R5 only 2.3% of parents of infants reported
379 having missed a vaccination appointment in the last 30 days) and a decline in the incidence of lost
380 jobs/incomes. However, other impacts were reported to be persistent. For example, even by R5, 14% of
381 children aged under 5 were still being left alone on at least one of the last seven days, and high levels of
382 food insecurity continued to be reported.

383 Underlying all of these was an almost universal experience of a significant economic shock, with almost all
384 respondents reporting a loss of work or income, especially earlier in the pandemic; 99.7% of respondents
385 reporting having experienced a reduction in work or income in R1. Strikingly, despite high levels of concern

386 about Covid-19, especially in early rounds, very few (less than 2%) of study participants reported direct
387 experience of Covid-19 in their family in any round.

388 **Strengths** of this study include its longitudinal design; five survey rounds spread over a year provide insights
389 into temporal changes and trends in the nurturing care of young children in these slums. In addition, the
390 explicit focus on people living in slums provides valuable insights into an often-underrepresented
391 demographic in ECD research(21). Finally, the multi-domain approach, encompassing all components of
392 nurturing care, offers a broad assessment of the impacts of the pandemic and attempts to control it on
393 young children in these settings.

394 **Limitations** include a reliance on self-reporting, which may introduce biases or inaccuracies in the data,
395 including both recall bias and the potential for response bias including strategic misrepresentation (if
396 respondents thought that replying in certain ways might lead to allocation of resources to their
397 predicament)(22). The reliance on a pre-existing database of potential respondents, all of whom had access
398 to a mobile phone, may also have introduced selection bias including an over sampling of better off
399 participants. In addition, the changes in the respondent pool over the study period could affect the
400 consistency of the findings (although efforts were made to account for the risk of age confounding in the
401 analysis of results). Finally, the focus on three slums in Nairobi limits the extrapolation of findings to other
402 settings.

403 **Situating these findings within the broader literature:** These findings are broadly consistent with other
404 research that has been published on the impacts of the pandemic on the care of young children, albeit with
405 few comparators from informal settings and studies which have tracked impacts over time. For example,
406 health service disruption has been documented through time-series analyses in Kenya which showed that
407 the biggest declines in activity were in outpatient visits and childhood immunisations, with some rebound as
408 the pandemic evolved(23). Several studies have documented the radical economic shocks precipitated by the
409 pandemic, including globally/regionally(24) and within Kenyan slums particularly, where the pandemic and

410 resulting government policies were reported to have had devastating consequences on the livelihood of slum
411 dwellers who were “left to choose between life and livelihood”(25), “violating” their human right to
412 food(26). Such findings were replicated in Bangladesh, where the impacts on household economics (27,28)
413 and the mental health of caregivers (27) were stark. In addition, the quantitative findings presented in this
414 paper are consistent with our qualitative research with parents living in Nairobi slums during the pandemic,
415 which described socio-economic impacts which were deep, protracted, and widely felt (29,30).

416 One review that looked at the impacts of the pandemic on Nurturing Care found a bias within the published
417 literature towards quantitative studies in high-income countries and those focused on caregiver mental
418 health(8) However, a wide range of UNICEF reviews has documented a broad set of global impacts on
419 children arising from the pandemic, including early learning losses(31), nutrition impacts(32), disruption to
420 child protection(33) and health services(34,35). Few studies have looked at trends over time as the pandemic
421 evolved, but some have sought to estimate how disruptions to health(36) and broader early childhood
422 adversities precipitated by the pandemic may translate into short- and long-term impacts(37).

423 By the final round of our data collection, around 1 in 5 children were attending paid childcare regularly. This
424 is lower than another estimate in a different Nairobi slum (Korogocho), in which 46% of employed and 23%
425 of unemployed mothers reported using paid childcare for daytime care for their children aged 1-3 years (38).
426 This variance could be related to differences in sampling, the ongoing impacts/legacy of the pandemic,
427 differences between the settings or differences in how the question was framed and asked. The fees charged
428 that we found are similar to another recent Kenyan study, and highlight the limited resources in the childcare
429 system(39).

430 **Unanswered questions and future research:** to build on this research it would be valuable to examine how
431 the disruptions noted in this study translate into impacts on child outcomes. In the short-term, this could
432 include child health and development outcomes and then school readiness, but longer term it will be
433 important to understand how the early childhood adversities experienced by this cohort of children, and

434 parents, translates into later life learning, earning and wellbeing. That said, in many ways it is more
435 important and urgent that further implementation research is conducted to develop and test intervention
436 strategies, potentially building on the potential of the childcare platform, to mitigate from some of these
437 disruptions. In addition, these findings underscore the need for better research to characterise the childcare
438 system, including the economics, policies and perspectives of key stakeholders involved, in and beyond
439 Kenya(40,41).

440 **Policy implications:** This research suggests a number of ways in which policy and practice can better serve
441 young children growing up in slums or informal settlements. Firstly, as noted by others(26) people, and
442 especially children, growing up in slums deserve a much greater consideration in public including pandemic
443 policy making. The application of blanket policies to very different settings ought to be avoided(25), and in
444 particular the practicalities and impacts of attempting to ‘lockdown’ a slum – where most residents shop
445 daily for necessities, and many rely on daily wages – in particular ought to be better recognised(42).
446 Secondly, the data presented here and in related studies yimplies an urgent need for implementation of
447 ambitious and well-resourced interventions to address both the underlying vulnerabilities experienced by
448 young children growing up in slums, and the ways that there were amplified by the pandemic and attempts
449 to control it. Paid childcare – a platform that seems to be widely used yet significantly under-resourced -
450 may provide an intervention opportunity to address some of the risks identified in this research(43). Finally,
451 noting that many of the risks to the wellbeing of children we predicted early in the pandemic with
452 accompanying calls for mitigation of harms to young children(37), given that these calls seem to have rarely
453 been heeded, it may be that more research and innovation is needed into the structural changes needed to
454 better bring the next generation’s voices and rights into decision making(44).

455

456 5 Conclusion

457 The early years are a period of both opportunity and vulnerability. This study explored how the care of young
458 children growing up in slums was affected by the Covid-19 pandemic and the control measures brought in to
459 control it. A deep and broad set of impacts across all domains of Nurturing Care were evident. While some of
460 the disruptions appeared to resolve over the five rounds of data collection, others – most notably those
461 related to the economic shocks related to the pandemic – persisted. Provision of paid childcare was
462 effectively suspended in the early part of the pandemic, but usage recovered over time. Collectively, these
463 findings imply an urgent need for greater policy attention being paid to the care of young children growing
464 up in slums, especially at times of crisis.

465

466 **6 Conflict of Interest**

467 The authors declare that the research was conducted in the absence of any commercial or financial
468 relationships that could be construed as a potential conflict of interest.

469 **7 Author Contributions**

470 RH, SB, BK, PK-W, and ZH were responsible for conceptualizing the study. RH played a key role in planning
471 the paper, leading the analysis, and writing the first draft of the paper. RM, with PK-W, SO, ZH and SB
472 supervised and supported the data collection. RH and RJ completed data cleaning and initial quality checks.
473 RH and SB and then all authors reviewed draft manuscripts. All authors edited the draft and contributed
474 important intellectual content. The final manuscript was approved by all authors.

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486 **3 Data Availability Statement**

487 The datasets analysed for this study can be found in the LSHTM Data Compass site for the NECS Study(45).

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489

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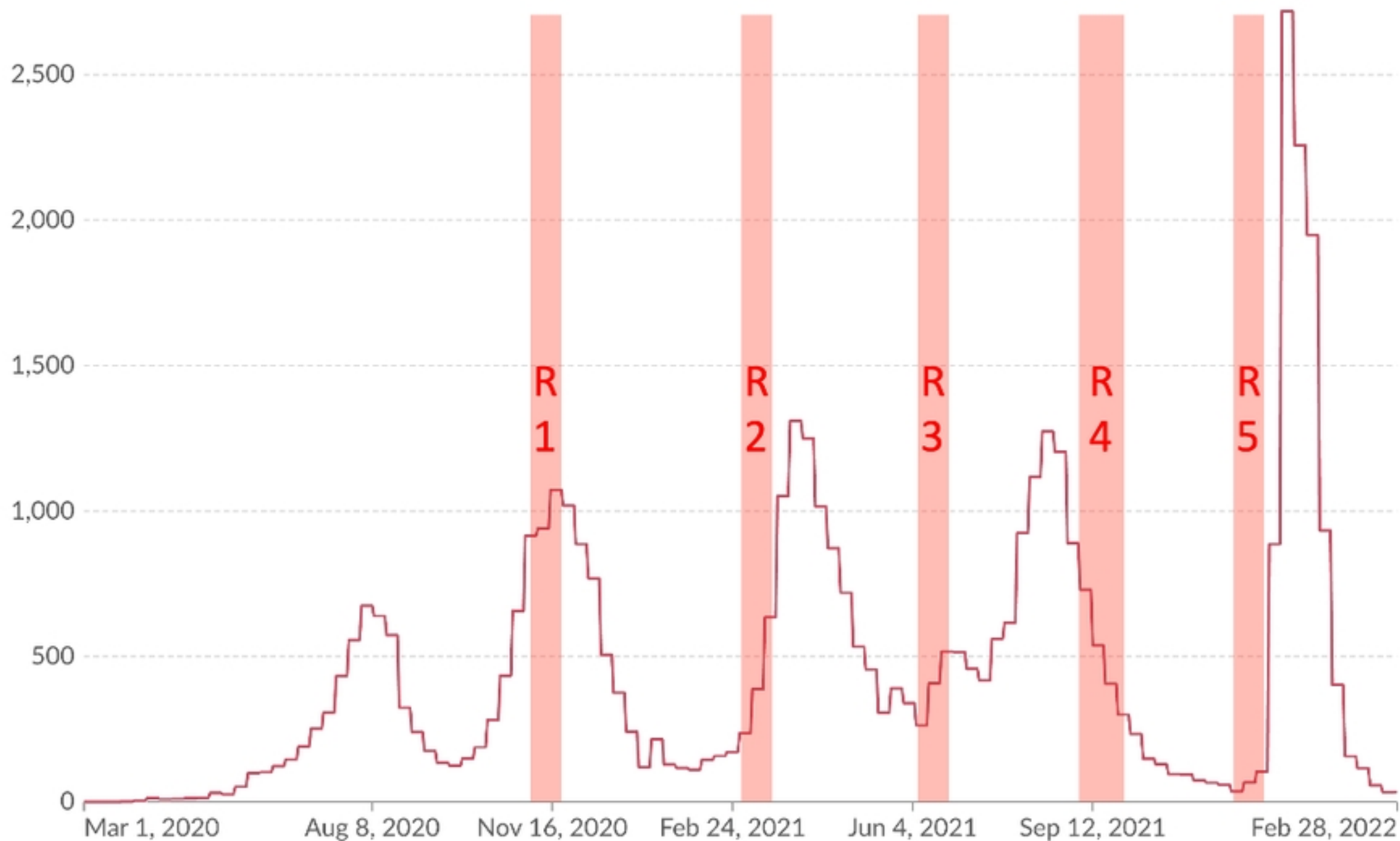
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621

Figure 1: Graph illustrating timing of data collection in relation to 7-day rolling average numbers of confirmed Covid-19 cases in Kenya



Notes: Data source: WHO Covid-19 Dashboard (<https://covid19.who.int/>), graphic adapted with permission CC-BY (<https://creativecommons.org/licenses/by/4.0/>) from OurWorldInData (<https://ourworldindata.org/coronavirus/country/kenya>). Red bars illustrate approximate data collection periods for Rounds 1 (R1) to 5 (R5) of data collection.

Figure 1

Figure 2:
The probability of using childcare for each age group in each round

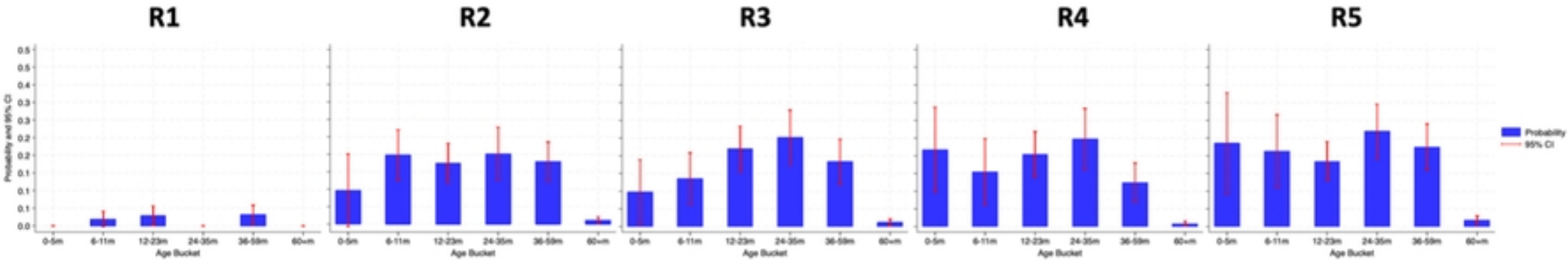


Figure 2

"In the past 3 days, did you, or anyone else age 15 or over, engage in any of the following activities with [name]?"

		0-5m	6-11m	12-23m	24-35m	36-59m	60+m	All ages	Scale (%)
% who READ BOOKS	R1	11.6	15.5	36.4	45.7	57.8		32.1	0
	R2	26.7	25.7	37.3	44.8	55.2	76.7	43.6	20
	R3	7.5	19.5	42.4	63.3	65.7	78.4	48.7	40
	R4	9.1	15.4	38.4	47.3	73.5	78.4	47.1	60
	R5	8.8	13.8	43.3	56.8	78.8	66.7	52.6	80
% who TELL STORIES	R1	17.9	18.7	37.1	40.3	50.3		32.0	100
	R2	13.3	30.1	35.5	35.2	45.9	44.2	37.0	
	R3	12.5	18.4	37.3	57.5	46.7	56.8	40.4	
	R4	9.1	15.4	32.9	47.3	52.3	48.7	37.8	
	R5	8.8	17.2	35.4	53.6	59.6	57.1	44.2	
% who SING SONGS	R1	72.6	81.9	78.6	69.0	60.3		72.4	
	R2	66.7	84.1	89.9	64.8	60.5	55.8	73.3	
	R3	67.5	78.2	77.2	72.5	67.9	64.9	72.7	
	R4	63.6	71.2	66.4	79.6	71.2	64.9	70.3	
	R5	70.6	75.9	82.6	75.2	72.9	73.0	76.4	
% who TAKE OUTSIDE	R1	37.9	56.1	57.1	51.9	53.4		50.6	
	R2	66.7	71.7	71.6	65.7	63.4	53.5	67.0	
	R3	70.0	67.8	72.2	72.5	59.9	64.9	68.1	
	R4	52.3	71.2	76.0	82.8	65.2	67.6	71.3	
	R5	41.2	58.6	69.7	80.8	72.2	50.8	68.0	
% who NAME/COUNT/DRAW	R1	12.6	24.5	44.3	58.1	68.3		39.9	
	R2	23.3	33.6	52.1	57.1	67.4	79.1	54.3	
	R3	7.5	34.5	45.6	69.2	66.4	75.7	53.0	
	R4	15.9	30.8	45.9	66.7	75.0	73.0	55.1	
	R5	17.7	36.2	48.9	68.8	78.2	79.4	60.4	
% PLAY	R1	66.3	78.1	77.1	69.8	70.8		72.1	
	R2	73.3	87.6	84.6	70.5	70.9	55.8	76.6	
	R3	77.5	73.6	79.1	79.2	67.2	67.6	74.6	
	R4	75.0	69.2	78.1	80.7	78.8	64.9	76.6	
	R5	73.5	87.9	82.0	83.2	80.1	76.2	81.3	

Figure 3

% LEFT ALONE for >1hr one or more days in the last seven



Figure 4