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Factors influencing rapid progress in child health in post-conflict Liberia: a country case study on progress in child survival, 2000-2013

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3 1 Factors influencing rapid progress in child health in post-conflict Liberia: a country case study on progress
4 2 in child survival, 2000-2013
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28 ABSTRACT

29 Objectives: Only 12 countries in the World Health Organization's African region met Millennium
30 Development Goal #4 (MDG#4) to reduce under-five mortality by two-thirds by 2015. Given the
31 variability across the African region, a four country study was undertaken to examine barriers and
32 facilitators of child survival prior to 2015. Liberia was selected for an in-depth case study due to its
33 success in reducing under-five mortality by 73%, and thus successfully meeting MDG#4. Liberia's success
34 was particularly notable given the civil war that ended in 2003. We examined the factors contributing to
35 their reductions in under-five mortality.

36 Design: A case study approach drawing on data from quantitative indicators, national documents, and
37 qualitative interviews was used to describe factors that enabled Liberia to rebuild their maternal,
38 neonatal and child health (MNCH) programs and reduce under-five mortality following the country's civil
39 war.

40 Setting: The interviews were conducted in Monrovia (Montserrado County) and the areas in and around
41 Gbarnga, Liberia (Bong County, North Central region).

42 Participants: Key informant interviews were conducted with Ministry of Health officials, donor
43 organizations, community-based organizations involved in MNCH, and health care workers. Focus group
44 discussions were conducted with women who have experience accessing MNCH services.

45 Results: Three factors contributed to the reduction in under-five mortality: national prioritization of
46 MNCH after the civil war; roll-out and scale-up of integrated packages of services that expanded access
47 to key interventions and promoted inter-sectoral collaborations; and community outreach and provision
48 of MNCH services using community health workers and trained traditional midwives to expand access to
49 care and improve referrals.

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3 50 Conclusions: Although Liberia experiences continued challenges related to limited resources, the
4
5 51 strategies employed by Liberia enabling their rapid progress may provide insights for reducing under-five
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7 52 mortality in other post-conflict settings.
8
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10 53 Keywords: Public health, Qualitative research, Community child health < Paediatrics, International health
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12 54 services < Health services administration & management
13
14

15 55 Strengths and limitations of this study
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- 18 56 • Presents qualitative and quantitative data on implementation of maternal, neonatal and child
19
20 57 health (MNCH) interventions in Liberia, which has been understudied in Liberia.
21
22
23 58 • Most studies exploring progress in child survival only present qualitative data from key
24
25 59 informants working within the healthcare system, but this paper also provides data from women
26
27 60 attempting to access services for themselves and their children in both urban and rural contexts.
28
29
30 61 • For the review of national MNCH documents, policies and strategies were not issued until after
31
32 62 2007 due to the civil war. While these documents contained retrospective assessments of the
33
34 63 preceding period, assessments of the impact of more recent policies or strategies were not
35
36 64 available.
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39 65 • The qualitative data was limited to a non-random sample of participants and conducted in two
40
41 66 counties (one urban, one rural). It is possible that the changes in under-five mortality in these
42
43 67 areas do not reflect changes at the national level and that the views and experiences of some
44
45 68 participants do not reflect those from other areas of Liberia.
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50 69 **INTRODUCTION**
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3 70 The under-five mortality rate has declined in sub-Saharan Africa from an estimated 180 deaths
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5 71 per 1,000 live births in 1990 to 83 deaths per 1,000 in 2015 ¹, yet this was not sufficient for this region to
6
7 72 meet Millennium Development Goal (MDG) #4 of reducing under-five mortality by two-thirds between
8
9 73 1990 and 2015 ². Nevertheless, as of 2015, 12 African countries had met their MDG#4 goal ¹. There is
10
11 74 thus much interest in understanding why some countries were able to meet MDG#4 while others were
12
13 75 not. Liberia has witnessed a dramatic reduction in under-five mortality from 255 to 70 deaths per 1,000
14
15 76 live births between 1990 and 2015 (Fig 1) ¹. This 73% reduction in mortality rates means that Liberia
16
17 77 effectively met MDG#4 ahead of schedule. Infant mortality has undergone a similar 69% reduction over
18
19 78 the period, while neonatal mortality has declined much less rapidly.

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23
24 79 Fig 1. Under-five, infant, and neonatal mortality rates for Liberia in 1990, 2000, 2010, and 2015 (solid
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26 80 circles) with annual rates of reduction (ARR) for each period (solid and dashed lines).

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28 81
29
30 82 Source: Levels and Trends in Child Mortality: Report 2015 - Estimates Developed by the United Nations
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32 83 Inter-agency Group for Child Mortality Estimation ¹. Report and data accessed July 2015 from
33
34 84 www.childmortality.org.

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41 86 Liberia's accomplishments are especially notable given the 14 years of civil war, ending in 2003,
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43 87 that destroyed most of Liberia's national infrastructure, eroded the country's social fabric, and cost at
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45 88 least 200,000 lives. Many health facilities were destroyed, skilled personnel were lost, and essential
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47 89 medicines and supplies were scarce ³. Liberia emerged from this crisis with extremely limited health
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49 90 infrastructure and poor maternal, neonatal and child health (MNCH) services. As a result of a strong
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51 91 commitment by the Liberian government in collaboration with individuals and organizations from across
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53 92 civil society, the private sector and the general public, the country made notable gains towards re-

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3 93 establishing peace and security, revitalizing the economy, strengthening governance and the rule of law,
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5 94 and rebuilding the national health infrastructure and MNCH services³. Bornemisza, et al.⁴ describe how
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7 95 the post-conflict period provides a unique opportunity for countries to address problems with their
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9
10 96 health care systems, as it is easier to create widespread change during a rebuilding period. Thus,
11
12 97 identifying the factors that enabled Liberia to rapidly improve MNCH services after the civil crisis can
13
14 98 inform other countries coming out of conflict or looking to make large-scale changes. In addition, Liberia
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16 99 could use information from its post-conflict successes to inform and contribute to its own recent
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19 100 rebuilding efforts after the 2014-2015 Ebola virus epidemic.

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21
22 101 There is a growing body of literature on MNCH in Liberia that explores the country's efforts to
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24 102 implement proven MNCH interventions and expand access to care. Little research was published during
25
26 103 the years of the country's civil crisis and MNCH studies since have been primarily localized or
27
28 104 quantitative⁵⁻¹⁵. These studies focused on access and utilization of specific MNCH interventions. Much of
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30
31 105 the qualitative or mixed-methods literature from Liberia to-date has focused primarily on maternal and
32
33 106 reproductive health¹⁶⁻¹⁹. Only one of the mixed-methods studies from Liberia evaluated integration and
34
35 107 delivery of MNCH services²⁰. A few studies have reported on positive outcomes of specific interventions
36
37 108 related to mobile data collection and monitoring^{21,22}, and training of community health workers²³ and
38
39 109 midwives to deliver MNCH interventions at the community level^{24,25}. There have also been recent
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42 110 studies examining service usage, links between aspects of the healthcare system and the West African
43
44 111 Ebola outbreak²⁶⁻²⁹. There thus remains much to be understood about implementation of MNCH
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46 112 interventions and services and progress in reducing under-five mortality. While case studies from other
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48 113 countries making significant gains in child survival such as Niger, Uganda, Malawi, Ethiopia, Rwanda, and
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51 114 Tanzania³⁰⁻³⁴ have evaluated system-level factors contributing to their success, only Tanzania included
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53 115 qualitative information from individuals attempting to access services for themselves or their children.

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3 116 Therefore, this paper contributes to the growing literature about how progress in reducing under-five
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5 117 mortality can be achieved in a resource-limited country in Sub-Saharan Africa.
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8 118 To increase understanding of the factors influencing progress in child survival in the Africa
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10 119 Region, we conducted an ecological study of factors associated with reductions in under-five mortality³⁵,
11
12 120 followed by four mixed methods case studies of countries both on-track (Liberia and Zambia) and not on-
13
14 121 track (Kenya and Zimbabwe) to meet MDG#4³⁶⁻³⁸. Our case study of Liberia within this larger parent
15
16 122 study provides a notable opportunity to examine in-depth the specific factors influencing child survival in
17
18 123 a post-conflict setting in sub-Saharan Africa. By evaluating national policies and strategies, qualitative
19
20 124 data, and quantitative indicator data we identified several overarching factors, which were consistently
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22 125 reported in our study data sources to have improved access and utilization of care for children under-
23
24 126 five, and reduced under-five mortality.
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29 127 **METHODS**

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32 128 The period of interest for the parent study on child survival in Africa, from which this case-study
33
34 129 arose, was from the beginning of the MDG movement in 2000 through 2013. The objective was to better
35
36 130 understand positive and negative factors influencing child survival in sub-Saharan Africa as countries
37
38 131 approached the end of the MDG period (2015). Prior to 2000, country-level data for these factors were
39
40 132 not reliably available from many African countries. This case study utilized indicator data for the years
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42 133 closest to 2000, 2005, and 2013 (details below), a review of national policies and strategies issued
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44 134 between 2007 and 2013, following the civil conflict, and key informant interviews and focus groups with
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46 135 community women conducted in 2013.
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50 136 **MNCH indicator data**

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3 137 Data were obtained on those core MNCH indicators monitored by Countdown to 2015. Most
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5 138 data were obtained from the World Bank Data Catalogue³⁹, a repository of national, regional, and global
6
7 139 indicator data compiled from officially-recognized sources, including national Demographic and Health
8
9 140 Surveys (DHS) and other national surveys. Data for indicators not readily available from the World Bank
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11 141 Data Catalogue were obtained from the 2007 and 2013 Liberian DHS^{40,41}.

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15 142 Given the scope of the larger study within which this case-study is nested, this study aimed to
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17 143 include indicator data most closely corresponding to the beginning and end of the study period to enable
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19 144 description of trends during the period. Unfortunately, no DHS was conducted in Liberia between 1986
20
21 145 and 2007 due to the civil war, resulting in substantial missing data for the time period around 2000. We
22
23 146 therefore also included 2007 DHS data to better visualize changes over time. Estimates were not always
24
25 147 available for exact years 2000, 2007, and 2013, but data were available within a one to two-year window
26
27 148 (see Fig 2).

31 149 **Review of MNCH policies and strategies**

32
33 150 An information abstraction guide based on relevant global strategies related to child survival⁴²⁻⁴⁷
34
35 151 was developed to guide the document procurement and review process according to the following eight
36
37 152 content areas: 1) Health care system (including leadership, structure, human resources for health, access
38
39 153 & utilization, monitoring & evaluation, and accountability), 2) National health strategies and policies (and
40
41 154 regulations and laws, when applicable), 3) MNCH interventions, 4) Clinical standards and guidelines, 5)
42
43 155 Commodities and essential medicines, 6) Financial flows and resources, 7) Effective partnerships, and 8)
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45 156 Other contextual factors (e.g., conflict, political environment, sanitation and hygiene, nutrition and food
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47 157 security, education, and human rights).

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52 158 Policies and strategies pertaining to overall national health, MNCH, and those from other sectors
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54 159 related to MNCH (e.g., education, water and sanitation, and agriculture and nutrition) were obtained

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3 160 from the WHO African Region office, the WHO country focal points for Liberia, and Liberia's Ministry of
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5 161 Health (MOH; formerly Ministry of Health and Social Welfare). These documents were reviewed and any
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7 162 additional documents referenced and deemed important for the review (according to the abstraction
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9 163 guide) were obtained from WHO or MOH. The final list of reviewed documents can be found in S1 Table.
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164 Table 1. Content areas and key questions and themes related to child survival explored during the review of national health policies and
165 strategies, key informant interview, and focus groups with community women.

Specific questions for review of national policies and strategies	Specific themes explored across content areas with key informants	Specific themes explored across content areas with community women
What policies and strategies related to child health were in place between 2000 and 2013 (including changes during this period)?	Issues related to program evaluation, access and utilization, coverage, impact, and sustainability, as appropriate.	Barriers and facilitators to accessing and utilizing MNCH services, including cultural and community factors.
What challenges were stated as hindering progress towards MDG#4?	Knowledge and experiences related to MNCH across the <i>health care continuum</i> (prenatal care through age 5 years).	Experiences related to MNCH across the <i>health care continuum</i> .
What facilitators were stated as enabling progress towards MDG#4?	Knowledge and experiences related to MNCH across the <i>health system continuum</i> (community to tertiary hospitals).	Experiences related to MNCH across the <i>health system continuum</i> .
What plans for change or improvements were either implemented after 2013 or were proposed as a measure to improve child survival?		

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3 166 Each document was reviewed by two authors (MAB, CAH) and information was recorded and
4
5 167 summarized according to the abstraction guide. In order to avoid biased interpretation of the
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7 168 information documented, the abstracted information was reported as it was stated in the original
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9
10 169 source, and efforts were made not to overstate or minimize the original information or to add
11
12 170 commentary not contained in the source.
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15 171 **Qualitative study procedures**

16 17 18 172 Study location and participants

19
20 173 Because important differences in MNCH often exist between urban and rural areas, participants
21
22 174 for the qualitative study were included from both urban and rural areas. The study design of the parent
23
24 175 study (consisting of four country case-studies) called for utilizing the country DHS to compare region-
25
26 176 specific under-five mortality rates and declines in mortality over the study period. Urban and rural sites
27
28 177 for the qualitative study were to be selected from the region or county whose annual rate of reduction in
29
30 178 under-five mortality most closely matched that of the nation as a whole. In the case of Liberia, the 1986
31
32 179 DHS only reported mortality for three counties, while the 2007 DHS reported mortality rates for
33
34 180 Monrovia and six regions comprised of three counties each^{41 48}. As such, specific locations
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36 181 representative of Liberia's progress as a nation could not be conclusively identified. Following discussions
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38 182 with the in-country Primary Investigator (SBK) Monrovia (Montserrado County) was selected as the
39
40 183 urban location with focus groups conducted in the Paynesville and New Kru Town areas, and the areas in
41
42 184 and around Gbarnga (Bong County, North Central region) were chosen as the rural location with focus
43
44 185 groups conducted in Gbarnga and Totota. While we cannot ensure these locations experienced declines
45
46 186 in under-five mortality similar to Liberia as a whole, the other country case studies were often conducted
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48 187 in the capital (urban site) and a nearby rural region. Bong County was selected because it was reasonably
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3 188 accessible for conducting the study in a timely manner and was not drastically different from other areas
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5 189 of the country in terms of demographics and infrastructure (including health infrastructure).

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7 190 Data were obtained from semi-structured, key informant interviews with Ministry of Health
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9 191 (MOH) officials, donor organizations, community-based organizations (CBO) involved in MNCH, and
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11 192 health care workers (HCW). Data were also obtained from four focus group discussions, two in Monrovia
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13
14 193 and two in Bong County, with women who have experience accessing MNCH services. Interviews and
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16 194 focus groups were conducted between October 30 and December 19, 2013.

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20 195 Eligibility criteria and identification of study participants

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23 196 All participants, whether key informants or focus group women, were eligible for the study if
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25 197 they met the following criteria: 1) being 18 years of age or older, 2) having adequate knowledge or
26
27 198 experiences related to childhood survival specified for each participant group below, 3) speaking English
28
29 199 or Liberian English, and 4) being able to provide written informed consent. Specific inclusion criteria for
30
31 200 each key informant group included the following: national or provincial-level officials working in
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33 201 government-level health care system administration, policy-making, program development, leadership,
34
35 202 or any aspect of MNCH (MOH officials); directors, managers, or other leaders of entities providing
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37 203 financial or other aid for MNCH services, or international or national organizations focusing on MNCH or
38
39 204 having MNCH as one component of their mission (Donor organizations, DO); directors, leaders, or
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41 205 managers working for a CBO involved in or providing referrals to MNCH services; and professionally
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43 206 trained physicians, nurses, clinical officers, or other health-related staff working in a health facility
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45 207 providing MNCH care (HCPs).

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50 208 Similar numbers of participants from each key informant group were enrolled, and a range of
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52 209 ages, work experiences, and positions/roles within each group was sought through the use of
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55 210 department registers when available. Additionally, efforts were made to balance the number of urban

211 and rural participants among the HCWs and CBO workers. Lists of potential key informants from each
 212 group were developed by the in-country research team with assistance, as needed, from the WHO
 213 National Professional Officer for Family Health and the MOH Deputy Programme Manager for the
 214 Expanded Program on Immunizations. A letter signed by an official from the MOH was sent to each
 215 potential key informant participant informing them of the purpose of the study, risks and benefits of
 216 participation, and describing the interview process. These were followed-up with a phone call or email
 217 from the research team to set up a meeting time for those interested. Basic demographic characteristics
 218 of the key informants are shown in Table 2.

219
 220
 221 Table 2. Characteristics of key informants in Liberia.

	Ministry of Health (N=11)		Donor organization (N=8)		Community Based Organization (N=14)		Health Care Worker (N=14)	
Sex, N (%)								
Male	8	(73)	5	(62.5)	10	(71)	5	(36)
Female	3	(27)	3	(37.5)	4	(29)	9	(64)
Age, M (IQR)								
	45	(38, 55)	40	(36, 49)	40	(36, 50)	45	(40, 54)
Ethnicity, N (%)								
Bassa	1	(9)	1	(12.5)	0	(0)	0	(0)
Grebo	2	(18)	1	(12.5)	1	(7)	2	(14)
Kissi	1	(9)	0	(0)	1	(7)	0	(0)
Kpelle	2	(18)	1	(12.5)	4	(29)	6	(43)
Lorma	2	(18)	0	(0)	0	(0)	1	(7)
Mano	2	(18)	1	(12.5)	4	(29)	1	(7)
Other*	1	(9)	4	(50)	4	(29)	4	(28)
Education, N (%)								
Secondary	1	(9)	0	(0)	0	(0)	0	(0)

Post-secondary	10	(91)	8	(100)	14	(100)	14	(100)
Median (IQR) years working for organization	7	(6, 9)	1	(1, 6)	5	(3, 13)	7	(2, 15)

222 * Other includes one each of Belleh, Dahn, Gbandi, Gola, and Kru; five foreign nationals (Ghana, Kenya, Nigeria,
223 Sierra Leone, and Uganda); and 3 not reported

224 Women were recruited to participate in focus groups using informational flyers or
225 advertisements posted in different health centers and surrounding communities. As with the key
226 informants, a balance was sought in the level of education and participants with live and deceased
227 children, as well as a diversity of experiences and opinions regarding access and utilization of MNCH
228 services. Written informed consent was obtained from all enrolled participants. Community women
229 were provided with a small monetary incentive for their participation. Basic demographic and health
230 characteristics of the community women are shown in Table 3.

231
232 Table 3. Characteristics of female focus group participants in Liberia.

	Rural participants (N=16)		Urban participants (N=21)	
Age, M (IQR)	26	(22, 32.5)	28	(21, 38)
Ethnicity, N (%)				
Kpelle	12	(75)	1	(5)
Lorma	2	(13)	2	(10)
Bassa	0	(0)	9	(43)
Kru	0	(0)	7	(33)
Vai	0	(0)	2	(10)
Other*	2	(13)	0	(0)
Education, N (%)				
None	2	(14)	2	(10)

Primary	7	(50)	5	(24)
Secondary	3	(21)	13	(62)
Post-secondary	2	(14)	1	(5)
Travel time to health care (dry season), N (%)				
Less than one hour	15	(94)	19	(90)
One to two hours	0	(0)	2	(10)
More than two hours	1	(6)	0	(0)
Number of living children, M (IQR)	1	(1, 3)	2	(1, 4)
Age of youngest child, M (IQR)	2 yr	(11 mo, 4 yr)	2 yr	(1 yr, 3 yr)
Any children who died <5yrs old, N (%)				
No	12	(80)	12	(57)
Yes	3	(20)	9	(43)
Place of delivery for latest pregnancy, N (%)				
Health facility	16	(100)	17	(81)
Home	0	(0)	4	(19)
Birth attendant for latest pregnancy, N (%)				
Doctor	2	(13)	3	(14)
Nurse/midwife	14	(88)	17	(81)
Traditional birth attendant	0	(0)	1	(5)

233 * Other includes one each Kisii and Mandingo

234 Interview and discussion guides

235 Interview guides for key informants and discussion guides for focus groups with community

236 women were developed, pilot tested through cognitive interviewing⁴⁹, and revised as needed. The

237 guides focus on barriers to and facilitators for improving child survival in areas related to MNCH (Table

238 1), corresponding to the structure for the review of national health policies and strategies. Not all

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2
3 239 content areas were appropriate for each key informant group, but each topic was asked of at least two
4
5 240 of the four groups. Focus group discussions with community women focused only on the health care
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7 241 system, MNCH interventions, medicines, and contextual factors content areas. While participants could
8
9 242 discuss the entire period from 2000 forward, most participants recalled more recent information and
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11 243 experiences.
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15 244 Data collection

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18 245 Key informant interviews were conducted in English by one research assistant using the
19
20 246 appropriate interview guide and were audio recorded. The focus group discussions were conducted in
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22 247 Liberian English and also audio recorded. Two research assistants were present at each focus group to
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24 248 facilitate discussion and note-taking.
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27 249 Following completion of the interviews and focus groups, audio recordings were transcribed by
28
29 250 the research assistants and field notes incorporated into the transcript. Transcripts were coded and
30
31 251 analyzed using the software Atlas.ti (Atlas.ti Scientific Software Development GmbH, Berlin, Germany)⁵⁰.
32
33 252 Deductive themes were determined *a priori* based on interview guides and key topics of interest based
34
35 253 on literature review. Additional themes were also identified upon review of the transcripts. Text was
36
37 254 coded and reviewed for patterns of consistency, variation, relationships between themes and exemplary
38
39 255 cases or quotations^{51,52}. Ethical approval for the qualitative portion of the study was obtained from the
40
41 256 Vanderbilt University Medical Center and the University of Liberia-Pacific Institute for Research and
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43 257 Evaluation.
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48 258 Patient involvement

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3 259 Patients were not involved in the design of this study. Results were disseminated to Ministry of Health
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5 260 and WHO representatives from Liberia, and a presentation and report detailing results were made
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7 261 available to these representatives to aid further dissemination to other stakeholders.
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9

10 262 **RESULTS**

11 12 13 263 **MNCH coverage Indicators** 14 15 264

16
17 265 Indicator coverage data from 2000 were not available for six of the thirteen core indicators
18
19 266 shown in Fig 2. Liberia has improved coverage of nine of these indicators during the study period.
20
21 267 Highest current indicator coverage is seen for pregnant women receiving antenatal care (ANC) (96%),
22
23 268 vitamin A supplementation (88%), pregnant women receiving at least four ANC visits (78%), and
24
25 269 improved water sources (75%; Fig 2). Coverage was below 50% for improved sanitation (17%), postnatal
26
27 270 visits within two days for all deliveries (35%), use of insecticide treated bednets (38%), and diarrhea
28
29 271 treatment (46%; Fig 2).
30
31
32

33 272 Fig 2. Changes in child survival indicator coverage in Liberia, 2000, 2007, and 2013*.
34
35

36 273 *Estimates were not always available for years 2000, 2007, and 2013, in which case the nearest estimate
37
38 274 between 1999 and 2000, 2005 and 2007, or 2012 and 2013 was used; data were not available for the six
39
40 275 indicators showing an asterisk (*) during the 2000 time period.
41

42 276 †Among all births, both inside and outside a health facility
43

44
45 277 ‡Children 12-23 months old who have received BCG, measles and three doses each of DPT and polio
46
47 278 vaccine (excluding polio vaccine given at birth)
48

49 279 §Children under 5 receiving oral rehydration and continued feeding
50

51 280 Source: World Development Indicators Data Catalogue from the World Bank
52

53
54 281 (<http://datacatalog.worldbank.org>; accessed August 2015) and Liberia DHS
55

1
2
3 **282 National document review and qualitative study**
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5
6 **283 National Prioritization of MNCH**
7

8
9 **284** Both national documents and key informants at nearly all levels highlighted the strong
10
11 **285** commitment the Liberian government made to re-building the health care system soon after the civil
12
13 **286** war ended. Key informants and national documents also described how MNCH was prioritized, not just
14
15 **287** within the MOH, but also by top leadership throughout all sectors of the government. As an example of
16
17 **288** Liberia's high level commitment to MNCH, key informants described how maternal and neonatal deaths
18
19 **289** were reported to the president of Liberia. Routine audits of maternal and neonatal deaths were also
20
21 **290** undertaken by county health boards to identify problems with care, and improve accountability and
22
23 **291** oversight. Community women rarely specifically commented on the government's prioritization of
24
25 **292** MNCH, but some did express appreciation for the government's role in rebuilding services after the
26
27 **293** conflict. This prioritization of MNCH by multiple levels in the government is illustrated in the quotations
28
29 **294** below:
30
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33

34 **295** "I mean it has been a painfully slow process, due to advocacy, to get government to that level of
35
36 **296** commitment but a lot of progress, a lot of gain has been made and I can tell you for instance now
37
38 **297** the President of Liberia is the president of the commission for women health in Africa and that's
39
40 **298** under the WHO-AFRO, I can tell you that the government had launched, had made maternal and
41
42 **299** newborn health one of the conditions that will undergo surveillance, meaning that maternal
43
44 **300** death should be reported, maternal and newborn death should be reported." (49 year old, male
45
46 **301** donor partner)
47
48
49

50 **302** "...I think all the things we do medication and everything government has been involved [in]...if
51
52 **303** you have anybody dying from giving birth they have this audit in this particular team that reports
53
54
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1
2
3 304 directly to the President of Liberia, so they are even involved in it..." (35 year old, female from
4
5 305 CBO partner)
6
7

8 306 "[NGOs and the government] are giving us knowledge [on] how to take care of ourselves and
9
10 307 what to do when you are pregnant, where to go and where not to go and what for you to eat...I
11
12 308 think, things have improved, because we having NGOs, we having government, we having UN,
13
14 309 many people coming in they helping us too. So things have improved bit by bit." (39 year old,
15
16
17 310 rural woman with 4 children)
18
19

20 311 Although child health has been recognized as an important priority by both the Liberian
21
22 312 government and donor partners working with Liberia, national health documents and key informant
23
24 313 interviews all indicated consistent concern that Liberia's high dependence on donor aid is unsustainable.
25
26 314 Due to strong donor funding and some government funding, most MNCH services were free during much
27
28 315 of the study period. Key informants and community women felt that the free services had contributed to
29
30 316 increased access and utilization. However, key informants and national documents indicated that the
31
32 317 government of Liberia needs to institutionalize services currently provided by external partners and take
33
34 318 more financial responsibility for the health sector.
35
36
37

38 319 "...we are donor dependent; the sources of funding either from the donor or the GOL
39
40 320 [Government of Liberia] but what comes into the ministry for maternal and child health issue is
41
42 321 very small but the input that partners are making if you count it, it's very huge. So we think that
43
44 322 for sustainability the government needs to play more roles because if these partners leave, the
45
46 323 gains that we are making, to sustain it might be difficult..." (46 year old, female MOH official)
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50 324 The Development and Implementation of Integrated Packages of Services
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3 325 Key informants indicated that the MOH did a good job of implementing extensive reforms of the
4
5 326 health system soon after the civil war, as well as continuously attempting to evaluate and update policies
6
7 327 and strategies to make gradual improvements. An often-cited example by key informants of this process
8
9 328 was the implementation of integrated packages of services, detailed in the quotations below:
10
11

12 329 "...I think there is an enabling environment from the government through the Ministry of Health
13
14 330 that is in place through the development of the ten years plan and the expanded program which
15
16 331 is the EPHS [Expanded Package of Health Services], which addresses child health and maternal
17
18 332 health, so first there is a will on the part of the government to address child health and maternal
19
20 333 health in the country." (49 year old, female donor partner)
21
22
23

24 334
25
26 335 "...the Ministry of Health, from the beginning a postwar country had a policy first that was
27
28 336 guiding the process; the BPHS [Basic Packages of Health Services]...So it had bases on how people
29
30 337 should implement the policy and also as time went by, maternal services improved over time
31
32 338 based on evaluation from the Ministry of Health and Social Welfare through their annual
33
34 339 accreditation looking at service delivery." (35 year old, male donor partner)
35
36
37

38 340 The National Health Policy and Plan ⁵³ focused on establishing the Basic Package of Health
39
40 341 Services (BPHS). National documents and key informants attributed rapid scale-up of MNCH
41
42 342 interventions immediately following the civil war to the effective framework set forth by the BPHS.
43
44 343 According to national documents, the BPHS also aimed to improve distribution and supervision of
45
46 344 healthcare providers through establishment of a salary scale, standardized job descriptions, and
47
48 345 supervision tools for all cadres. Although the BPHS is credited with restoring MNCH service delivery
49
50 346 across Liberia, several key informants stated that the BPHS did not adequately integrate services across
51
52 347 different sectors of MNCH, which they felt hindered delivery of maternal health and family planning,
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54
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1
2
3 348 nutrition and PMTCT. Additionally, components of the BPHS intended to improve human resources for
4
5 349 health were not fully implemented or did not appear to have the intended impact, as many key
6
7 350 informants and community women cited continued human resource issues such as a lack of qualified and
8
9 351 quality providers.

11
12 352 Recognizing the shortcomings of the BPHS, the National Health and Social Welfare Policy and
13
14 353 Plan⁵⁴ was developed and established the Essential Package of Health Services (EPHS) which aimed to
15
16 354 scale-up interventions (especially MNCH interventions), reduce inequities, improve collaboration across
17
18 355 different sectors, and improve quality at secondary and tertiary healthcare centers. The EPHS also sought
19
20 356 to increase the number of skilled workers available for labor and delivery to ensure that emergency
21
22 357 obstetric and neonatal care (EmONC) is available at all facilities. Key informants were quite positive
23
24 358 about the EPHS, feeling that it had improved collaboration between sectors and had improved quality of
25
26 359 care in some areas. Some key informants also felt that the clearer language in the policy documents
27
28 360 enabled the government to better set expectations and hold partners accountable when implementation
29
30 361 goals were not met.

31
32
33 362 "...from the BPHS to EPHS, it was EPHS they were able to strengthen that MCH part to include in
34
35 363 addition to nutrition, adolescence, reproductive health care and all of that sexual health but in
36
37 364 the past, those were very weak and gray areas; as long as the policy did not address them, they
38
39 365 became difficult for anyone to hold a partner accountable for any implementation. Uh, now, the
40
41 366 ministry has included that and there are more services." (47 year old, male CBO partner)

42
43
44 367 However, some key informants felt that the EPHS had not been completely implemented at all
45
46 368 levels, particularly the primary care level, due to lack of resources, both human and financial. The
47
48 369 incomplete implementation limits not only delivery of MNCH interventions, but also the collaboration
49
50 370 and coordination the EPHS was intended to promote. In addition, both key informants and some

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2
3 371 community women described continued shortages of healthcare providers, especially those trained in
4
5 372 delivery-related interventions, certified midwives, and pediatric specialists outside the capital of
6
7 373 Monrovia. As illustrated in the quotations below, community women and key informants noted that
8
9 374 limited availability of MNCH providers and poor attitudes of providers remained a barrier to utilizing and
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11
12 375 accessing care.

13
14
15 376 "...When I gave birth, the girl that attended to me because she left, her shift was over and she
16
17 377 left...that night I could die because I started bleeding right after giving birth. But because my
18
19 378 friend was a nurse she went there and attended to me that night. Those that were on shift that
20
21 379 night... never had time for me because nothing was there for me to tip in, so they just acted
22
23
24 380 careless on [with] me." (38 year old, urban woman with 4 children)

25
26
27 381
28
29 382 "Clinics are...not running twenty- four seven services, we have heard these challenges from them,
30
31 383 people go overnight with complaints and the health care provider says I am not paid for
32
33 384 overnight services so you have to wait until tomorrow; so lack of motivation at the service
34
35 385 provider end is also impeding the process." (37 year old, male CBO partner)

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38 386
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41 387 Although key informants were concerned about incomplete implementation of the EPHS, they
42
43 388 attributed improvements in malaria, PMTCT services, nutrition and reproductive health to the improved
44
45 389 integration between sectors that the EPHS provided, as illustrated in the quotations below. Community
46
47
48 390 women did not specifically describe implementation of the EPHS or differentiate between levels of the
49
50 391 healthcare system, but did discuss the quality of care they received at the facilities. Specifically, women
51
52 392 felt very positive about the care received during pregnancy and delivery, as well as educational and
53
54
55 393 preventive services provided at facilities.

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2
3 394 “...I think it has changed over the period because, in the past we had the BPHS that provided
4
5 395 minimum service at the health facility where when the pregnant woman comes, they only check
6
7 396 them and when they have malaria, they treat them and they go home. But this time around, the
8
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10 397 BPHS has been modified to EPHS and where, we look at a full package, the standards have
11
12 398 improved, the services have improved and they receive a whole package and deliver it to the
13
14 399 mother... [including] PMTCT services, immunization, nutrition, and other laboratory findings so as
15
16 400 to reduce the number of visits, she has to do at the health facility.” (33 year old, male MOH
17
18 401 official)

19
20
21 402 “...the nurses and the doctors especially at the hospital here, whenever they carry pregnant
22
23 403 woman there, they always cater to the person and talk [to] the person in a polite manner, try to
24
25 404 help the person...They always treat us free and at time [delivery] they give baby’s clothes free of
26
27
28 405 charge.” (43 year old, rural woman with 6 children)

29
30 406
31
32
33 407 “...when you give birth and the baby is growing up, you don’t have to wait for the child to fall sick
34
35 408 before you carry the child to hospital. You can take the child to hospital so the child will get
36
37 409 drugs [anti-malaria prophylaxis]...” (35 year old, urban woman with 4 children)

38
39 410
40
41 411 Community outreach and service delivery

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43
44 412 Liberia’s use of community outreach and service delivery was a third overarching factor
45
46 413 identified as facilitating achievement of MDG#4. The national Community Health Services Policy first
47
48 414 issued in 2008 and revised in 2011⁵⁵ outlined a standard set of outreach, health promotion and referral
49
50 415 services and specified the roles and responsibilities of community-based staff including general
51
52 416 community health volunteers (GCHVs) and Trained Traditional Midwives (TTMs). It further outlined how
53
54 417 they should be distributed geographically, supervised, evaluated, and that TTMs are to be compensated

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2
3 418 with monthly salaries while GCHVs work as volunteers but receive an incentive package. Both key
4
5 419 informants and community women were positive about their efforts at the community level, recognizing
6
7 420 how these cadres enhance referrals from the community to healthcare facilities and follow-up with
8
9 421 mothers and children in the community after they return home. GCHVs and TTMs were also highly
10
11 422 valued by community women for their assistance with the outreach campaigns “Reach Every District”
12
13 423 (RED) and “Reach Every Pregnancy” (REP), which were intended to improve immunization coverage and
14
15 424 maternal health, respectively. Both key informants and community women further described that GCHVs
16
17 425 and TTMs had likely increased coverage of antenatal and post-natal care by connecting women with the
18
19 426 healthcare system earlier in pregnancy and increased immunization coverage through outreach with
20
21 427 mobile vaccination sites, and improved education and communication.

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25
26 428 “...the vaccine team most of the time come around to give our children vaccine and deworm
27
28 429 them with the medicine. At time we can see some people with the megaphone
29
30 430 educating...pregnant women on how to take care of your children and even how to take care of
31
32 431 your community. As for the health campaign we can see them and we can benefit from them.”
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34 432 (38 year old, urban woman with 3 children)

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37
38 433 “Number one thing that is trying to work well is the TTMs and GCHVs, they are trying their best
39
40 434 with the referrals. They get any patient in the community, they bring them here... we have family
41
42 435 planning, we have EPI under MCH, we have PMTCT, ANC, labor and delivery, post-partum care
43
44 436 provided and ANC...and also do STI [testing] too...malaria...The only problem we have with our
45
46 437 GCHVs is that they are saying they are not been compensated so we don’t expect them to work
47
48 438 full time.” (43 year old, female health care worker)

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50
51
52 439 While attributing success at the community level to the efforts of GCHVs and TTMs, study
53
54 440 participants also felt these staff needed better compensation beyond what is currently provided to

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2
3 441 enable them to work more often. The insufficient number of GCHVs and TTMs was also cited as a
4
5 442 challenge affecting availability of health services. Key informants and national documents noted that due
6
7 443 to limited human and financial resources, local health clinics were not always staffed and community-
8
9 444 based interventions such as the RED and REP campaigns had not been implemented or adequately
10
11 445 supported in all areas.
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14

15 446 “...I remember some time ago they were trying to integrate the...reach every pregnant women;
16
17 447 reach every district, that is for the supervision for vaccine...but for the reach every pregnant
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19 448 woman actually it is not working 100%. If I will have to grade it may be it is working around 40 to
20
21 449 45% because of may be some supplies that supposed to be given or put into place it is not into
22
23 450 place so for that it is not 100%.” (34 year old, female CBO partner)
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27 451 **DISCUSSION**

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30 452 This case study identifies three components that have likely contributed to Liberia’s rapid post-
31
32 453 conflict decline in under-five mortality and attainment of MDG#4. First, the Liberian government made
33
34 454 re-establishment and funding of MNCH a top priority as it rebuilt its health system after the civil war.
35
36 455 Second, the development and implementation of integrated packages of services, first the BPHS followed
37
38 456 by the EPHS, enabled Liberia to restore basic MNCH services and interventions at all levels of the
39
40 457 healthcare system. The development and implementation of the BPHS and EPHS also demonstrated
41
42 458 Liberia’s ability to evaluate and re-work policies and strategies. The EPHS fostered further integration
43
44 459 and collaboration across multiple sectors, which allowed for expansion of PMTCT, nutrition, and other
45
46 460 MNCH services. The EPHS also sought to improve the availability of trained health workers and fully
47
48 461 functional health units, although challenges persisted despite these efforts. Third, provision of services at
49
50 462 the community level, such as outreach campaigns and use of GCHVs and TTMs to deliver basic MNCH
51
52 463 interventions, contributed to improved coverage of ANC, post-natal care, and immunizations, and also
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1
2
3 464 improved access and continuity of care in post-conflict Liberia by strengthening referrals between the
4
5 465 community and healthcare facilities. Each of these components is supported by the qualitative data
6
7 466 collected.

9
10 467 Liberia utilized a healthcare system recovery approach that has shown promise in other post-
11
12 468 conflict or conflict-affected settings. Specifically, Kruk, et al. (2010) emphasize the need for strong
13
14 469 national leadership and governance that makes restoration of basic health services a top national
15
16 470 priority. They also documented that, when a national government makes a strong commitment to
17
18 471 providing healthcare to the most vulnerable populations (such as mothers and children), this
19
20 472 commitment can contribute to the country's long-term stability and recovery efforts. A basic package of
21
22 473 health services enabling rapid roll-out and scale-up of MNCH and other primary health services has also
23
24 474 been deployed with some success in Afghanistan, South Sudan, Rwanda, and Bosnia and Herzegovina⁵⁶⁻
25
26 475⁶⁰, and is specifically recommended for conflict-affected settings^{4 12}. These packages of services typically
27
28 476 include key maternal, neonatal, and child health interventions, nutrition, and treatment for
29
30 477 communicable diseases (such as TB and HIV)⁵⁶⁻⁶². Afghanistan, similar to Liberia, revised their basic
31
32 478 package to also include additional services (for disability and mental health), recognizing the specific
33
34 479 needs of their population and the gaps in their original package. Researchers have suggested that basic
35
36 480 packages of services may help in initial scale-up and improvements, but require additional inputs and
37
38 481 adjustments to sustain these improvements^{56 57 59 63}.

39
40 482 Community-level education, empowerment, and outreach are also recommended to improve
41
42 483 utilization and access to basic interventions and improve referrals from the community to the facility
43
44 484 levels^{4 64-67}. Expanding cadres of traditional birth attendants and community health workers has been
45
46 485 found to be particularly key in restoring maternal and neonatal services in conflict-affected settings^{56 68-}
47
48 486⁷². Community health workers and community-level outreach and service delivery has also been a key
49
50 487 factor in the successes of other countries successfully reducing child mortality^{30-34 38 73}. Although many

1
2
3 488 conflict-affected settings have difficulties with referrals^{64 74 75}, this is one area where Liberia appears to
4
5 489 have made great progress through their use of GCHVs and TTMs, as described by key informants and
6
7 490 community women.

9
10 491 Although Liberia has made significant progress in MNCH, national documents and study
11
12 492 participants noted a number of challenges that persist and need to be addressed as Liberia moves
13
14 493 forward to achieve their post-2015 goals⁷⁶. This includes a shortage of healthcare providers, particularly
15
16 494 community-based midwives and pediatricians in rural areas, where the available providers are often
17
18 495 overburdened. The lack of healthcare providers and challenges associated with training and retaining
19
20 496 general and MNCH providers is well-documented in the literature from other conflict-affected countries
21
22 497 where brain-drain is common during and after conflict^{4 12 56 64 66 77-80}. Another weakness described in the
23
24 498 study is Liberia's high dependence on donor aid to provide many of the MNCH services. Although heavy
25
26 499 reliance on donor aid is consistent with other conflict-affected countries, there is little consensus on how
27
28 500 donors can best support post-conflict countries and few recommendations as to how and when post-
29
30 501 conflict settings should make the transition from donor-provided services to government-provided
31
32 502 services⁸¹⁻⁸³.

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36 503 This study provides one of the few country-case studies to assess progress towards achieving
37
38 504 MDG#4. Perhaps more importantly, it provides much needed insight into MNCH infrastructure and
39
40 505 experiences from an understudied, post-conflict, yet highly successful African country. This case-study
41
42 506 utilized a number of data sources, including national indicator data, country-authored health policies and
43
44 507 strategies, and qualitative data from key informants with different roles in MNCH and four focus group
45
46 508 discussions with women from urban and rural areas. By bringing together such diverse sources of data,
47
48 509 this study was able to assess the national-level measures used to enhance child survival and the
49
50 510 facilitators and challenges that affected full implementation and impact.

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2
3 511 Nevertheless, there are limitations for each of the study components. For the review of national
4
5 512 MNCH policies and strategies, new policies and strategies were not issued until after 2007 due to the
6
7 513 civil war. While these documents contained a retrospective assessment of the preceding period that
8
9 514 provided a comprehensive understanding of the earlier part of the study period, assessments of the
10
11 515 impact of more recent policies or strategies were not yet available. Moreover, country policies and
12
13 516 strategies covered different and sometimes overlapping time periods, making it difficult to distinguish
14
15 517 current from outdated information, and whether a stated plan had been implemented unless stated in a
16
17 518 document. Input from co-authors affiliated with the WHO and the MOH helped to clarify uncertainty.
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19

20
21 519 With regards to the interviews and focus groups, this study was limited to a non-random sample
22
23 520 of participants and conducted in two counties (one urban, one rural). It is possible that the changes in
24
25 521 under-five mortality in these areas do not reflect changes at the national level and that the views and
26
27 522 experiences of some participants do not reflect those from other areas of Liberia. However, participants
28
29 523 were selected to represent five different cadres of individuals who could share a diversity of MNCH
30
31 524 experiences, including some key informants with national-level responsibilities and 37 women from the
32
33 525 community. In addition, although we asked participants to reflect on long-term changes, most of the
34
35 526 participants recalled their current experiences and opinions on MNCH.
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38
39 527 In spite of these limitations, this study contributes to the growing literature on effective
40
41 528 approaches to scaling-up availability and use of MNCH services in conflict-affected settings. The factors
42
43 529 identified as contributing to Liberia's success in reducing under-five mortality can be applied in the many
44
45 530 other countries recovering from conflict, and can also be used to help Liberia recover from the 2014-
46
47 531 2015 Ebola epidemic. To further improve the delivery of essential health services and reduce under-five
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49 532 mortality in the post-2015 era, Liberia needs to maintain its prioritization of the health and welfare of
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51 533 pregnant women and children, continue to conduct comprehensive evaluation and enhancement of
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3 534 programs and interventions, and ensure sufficient human and financial resources are consistently
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5 535 available to ensure MNCH services are available close to the population.
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11 538 Acknowledgements

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30 552 Authors' contributions

31 553 Brault: Involved in conceptualization of research, development of methodology, data collection, data
32 554 analysis, data management, and manuscript development.

34 555 Kennedy: Involved in development of methodology, data collection, data management, and manuscript
35 556 development.

37 557 Haley: Involved in conceptualization of research, development of methodology, data collection, data
38 558 analysis, data management, and manuscript development.

39 559 Clarke: Involved in development of methodology, provision of study resources, and manuscript
40 560 development.

41 561 Duworko: Involved in development of methodology, provision of study resources, and manuscript
42 562 development.

43 563 Habimana: Involved in conceptualization of research, development of methodology, funding acquisition,
44 564 and manuscript development.

45 565 Vermund: Involved in conceptualization of research, development of methodology, funding acquisition,
46 566 and manuscript development.

47 567 Kipp: Involved in conceptualization of research, project administration, development of methodology,
48 568 funding acquisition, data collection, data analysis, data management, and manuscript development.

1
2
3 569 Mwinga: Involved in conceptualization of research, project administration, development of
4 570 methodology, funding acquisition, provision of study resources, and manuscript development.

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6 571 Data sharing statement

7
8 572 Annual mortality estimates used in Figure 1 are publicly available, without restriction, from
9 573 http://www.childmortality.org/index.php?r=site/graph#ID=LBR_Liberia. Indicator data used for Figure 2
10 574 are publicly available, without restriction, from the World Development Index, Africa Development
11 575 Index, and Health Nutrition & Population Statistics databases of the World Bank Data Catalog
12 576 (<http://data.worldbank.org/data-catalog/>) or Liberia Demographic and Health Survey reports available at
13 577 http://dhsprogram.com/Where-We-Work/Country-Main.cfm?ctry_id=22&c=Liberia&r=1. A detailed
14 578 description of each indicator's source can be found in the supplemental material from a previously
15 579 published study (Kipp et al. BMJ Open. 2016. <http://dx.doi.org/10.1136/bmjopen-2015-007675>).

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17
18 580 Supplemental table S1 lists the national documents reviewed for the study. These were obtained with
19 581 the permission and assistance of the Liberian co-authors and do not belong to any of the individual study
20 582 authors. As such, they cannot be made available as they belong to the Ministry of Health or other
21 583 agencies and some are still in draft form. Links to publicly available documents are provided in
22 584 Supplemental table S1. For investigators wishing to obtain other policy documents used in this study,
23 585 please contact Mr. Luke Bawo, Coordinator for Research and Health Management Information System,
24 586 Ministry of Health, email: lukebawo@gmail.com; or Hon. C. Sanford Wesseh, Assistant Minister for Vital
25 587 Statistics, Ministry of Health, email: cswesseh@yahoo.com.

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28
29 588 Under the Agreement for Performance of Work with the World Health Organization (sponsor) that was
30 589 used for this study, all rights to the data collected from key informants and community women belong to
31 590 the WHO. The WHO will entertain any reasonable proposal for use of the data. Researchers who are
32 591 qualified to manage and analyze qualitative data may request these data from Dr. Phaniel Habimana,
33 592 Team Leader, Child and Adolescent Health and Nutrition, WHO Regional Office for Africa, Brazzaville,
34 593 Congo; email: habimanap@who.int.

35
36
37 594 Interview, focus group discussion, and national document abstraction guides are available upon request
38 595 from the corresponding author; email: aaron.kipp@vanderbilt.edu. These data are not considered part
39 596 of the underlying data necessary to replicate the study.

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814 Supporting Information

815 S1 Table. Liberia policy, strategy, and other national documents reviewed

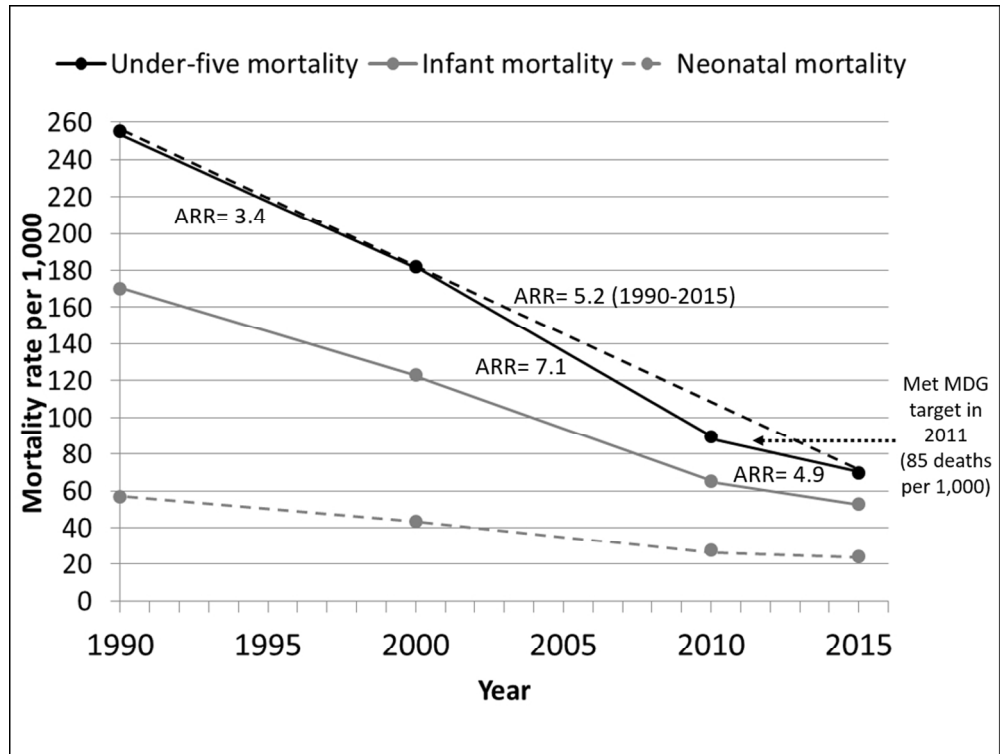


Figure 1: Under-five, infant, and neonatal mortality rates for Liberia in 1990, 2000, 2010, and 2015 (solid circles) with annual rates of reduction (ARR) for each period (solid and dashed lines).

197x148mm (150 x 150 DPI)

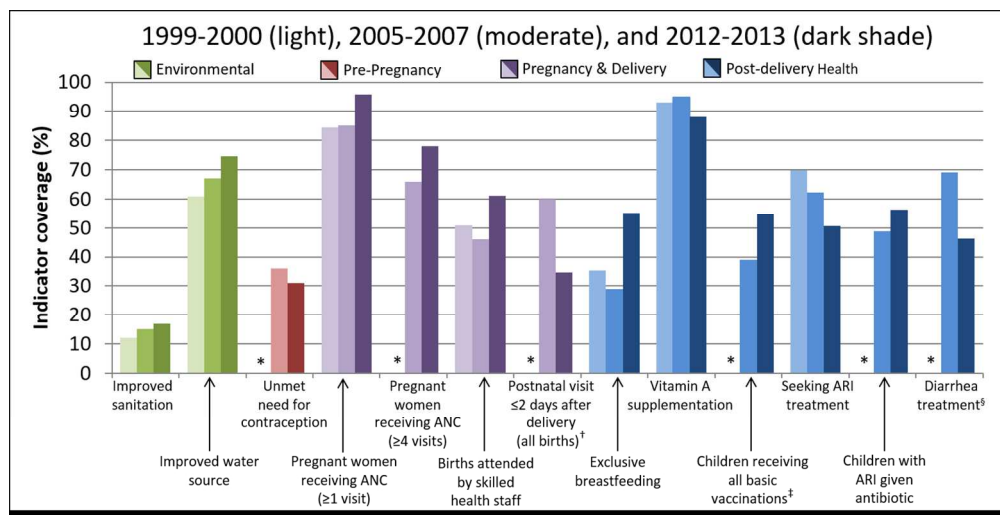


Figure 2: Changes in child survival indicator coverage in Liberia, 2000, 2007, and 2013*.

254x129mm (150 x 150 DPI)

Supplemental Table

Table S1. Liberia documents reviewed

Document title (dates if not otherwise specified in title)
<i>Primary source documents* (Newest to oldest)</i>
Republic of Liberia Agenda for Transformation: Steps towards Liberia Rising 2030 (2012)
Accelerated Action Plan to Reduce Maternal and Neonatal Mortality, 2012-2016
Situational Analysis of Newborn Health in Liberia (Parts A and B) (Drafts) (2012)
National Health and Social Welfare Policy and Plan, 2011-2021
Country Situational Analysis Report, 2011
Road Map for Accelerating the Reduction of Maternal and Newborn Morbidity and Mortality in Liberia, 2011-2015
Revised National Community Health Services Policy (2011)
Essential Package of Health Services: Primary Care, 2011-2021
Essential Package of Health Services: Secondary and Tertiary Care, 2011-2021
National Strategy for Child Survival in Liberia, 2008-2011
<i>Other documents reviewed† (Newest to oldest)</i>
Micronutrient Powder Supplementation of Young Children Linked with IYCF community promotion, 2012-2015
National Policy on Immunization, 2012
National EPI Strategic Plan, 2011-2015
National Sexual and Reproductive Health Policy (2010)
Integrated Guidelines of Prevention, Testing, Care and Treatment of HIV and AIDS in Liberia, 2010
Report on the Assessment of Infant and Young Child Feeding Practices, Policies and Programmes in

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3 Liberia 2009
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5 *Primary documents extensively reviewed to obtain information on each content area identified in the abstraction
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7 guide

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9 †Documents reviewed, but information on progress towards MDG#4 was sufficiently covered by the primary
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11 documents
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BMJ Open

Factors influencing rapid progress in child health in post-conflict Liberia: a mixed methods country case study on progress in child survival, 2000-2013

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2018-021879.R1
Article Type:	Research
Date Submitted by the Author:	11-Apr-2018
Complete List of Authors:	Brault, Marie; University of Connecticut System, Anthropology Kennedy, Stephen; University of Liberia, University of Liberia-Pacific Institute for Research & Evaluation (UL-PIRE) Africa Center Haley, Connie; Vanderbilt Institute for Global Health, ; Vanderbilt University Medical Center, Dept. of Medicine, Division of Epidemiology Clarke, Adolphus; Liberia Ministry of Health and Social Welfare Duworko, Musu; World Health Organization Country Office for Liberia Habimana, Phaniel; World Health Organization/Regional Office for Africa, Vermund, Sten; Vanderbilt University, Institute for Global Health Kipp, Aaron; Vanderbilt University, Mwinga, Kasonde; World Health Organization/Regional Office for Africa,
Primary Subject Heading:	Global health
Secondary Subject Heading:	Paediatrics
Keywords:	PUBLIC HEALTH, QUALITATIVE RESEARCH, Community child health < PAEDIATRICS, International health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT

SCHOLARONE™
Manuscripts

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3 1 Factors influencing rapid progress in child health in post-conflict Liberia: a mixed methods country case
4 2 study on progress in child survival, 2000-2013
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8 4 Marie A. Brault^{1*}, Stephen B. Kennedy², Connie A. Haley^{3,4}, Adolphus T. Clarke⁵, Musu C. Duworko⁶,
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3 **29 ABSTRACT**
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6 30 Objectives: Only 12 countries in the World Health Organization's African region met Millennium
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8 31 Development Goal #4 (MDG#4) to reduce under-five mortality by two-thirds by 2015. Given the
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10 32 variability across the African region, a four-country mixed methods study was undertaken to examine
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12 33 barriers and facilitators of child survival prior to 2015. Liberia was selected for an in-depth case study
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14 34 due to its success in reducing under-five mortality by 73%, and thus successfully meeting MDG#4.
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16 35 Liberia's success was particularly notable given the civil war that ended in 2003. We examined some
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18 36 factors contributing to their reductions in under-five mortality.
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22 37 Design: A case study mixed methods approach drawing on data from quantitative indicators, national
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24 38 documents, and qualitative interviews was used to describe factors that enabled Liberia to rebuild their
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26 39 maternal, neonatal and child health (MNCH) programs and reduce under-five mortality following the
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28 40 country's civil war.
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32 41 Setting: The interviews were conducted in Monrovia (Montserrado County) and the areas in and around
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34 42 Gbarnga, Liberia (Bong County, North Central region).
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37 43 Participants: Key informant interviews were conducted with Ministry of Health officials, donor
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39 44 organizations, community-based organizations involved in MNCH, and health care workers. Focus group
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41 45 discussions were conducted with women who have experience accessing MNCH services.
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44 46 Results: Three prominent factors contributed to the reduction in under-five mortality: national
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46 47 prioritization of MNCH after the civil war; implementation of integrated packages of services that
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48 48 expanded access to key interventions and promoted inter-sectoral collaborations; and use of outreach
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50 49 campaigns, community health workers and trained traditional midwives to expand access to care and
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52 50 improve referrals.
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3 51 Conclusions: Although Liberia experiences continued challenges related to limited resources, Liberia's
4
5 52 effective strategies and rapid progress may provide insights for reducing under-five mortality in other
6
7 53 post-conflict settings.

9
10 54 Keywords: Public health, Qualitative research, Community child health < Paediatrics, International health
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12 55 services < Health services administration & management

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15 56 Strengths and limitations of this study

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18 57 • Presents qualitative and quantitative data on implementation of maternal, neonatal and child
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20 58 health (MNCH) interventions in Liberia, which has been understudied in Liberia.
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23 59 • Most studies exploring progress in child survival only present qualitative data from key
24
25 60 informants working within the healthcare system, but this paper also provides data from women
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27 61 attempting to access services for themselves and their children in both urban and rural contexts.
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29 62 • For the review of national MNCH documents, policies and strategies were not issued until after
30
31 63 2007 due to the civil war. While these documents contained retrospective assessments of the
32
33 64 preceding period, assessments of the impact of more recent policies or strategies were not
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35 65 available.
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38 66 • The qualitative data were limited to a non-random sample of participants and conducted in two
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40 67 counties (one urban, one rural). It is possible that the changes in under-five mortality in these
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42 68 areas do not reflect changes at the national level and that the views and experiences of some
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44 69 participants do not reflect those from other areas of Liberia.
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72 INTRODUCTION

73 Under-five mortality has declined in sub-Saharan Africa from an estimated 180 deaths per 1,000
74 live births in 1990 to 83 deaths per 1,000 in 2015 ¹, yet this was not sufficient for this region to meet
75 Millennium Development Goal (MDG) #4 of reducing under-five mortality by two-thirds between 1990
76 and 2015 ². Nevertheless, as of 2015, 12 African countries had met their MDG#4 goal ¹. There is thus
77 much interest in understanding why some countries met MDG#4 while others did not. Liberia witnessed
78 a dramatic reduction in under-five mortality from 255 to 70 deaths per 1,000 live births between 1990
79 and 2015 (Fig 1) ¹. This 73% reduction in mortality rates means that Liberia effectively met MDG#4 ahead
80 of schedule. Infant mortality saw a similar 69% reduction over the period, while neonatal mortality
81 declined less rapidly.

82 Figure 1 here.

83 Liberia's accomplishments are especially notable given the 14 years of civil war, ending in 2003,
84 that destroyed most of the national infrastructure, eroded the country's social fabric, and cost at least
85 200,000 lives. Many health facilities were destroyed, skilled personnel were lost, and essential medicines
86 and supplies were scarce ³. Liberia emerged from this crisis with extremely limited health infrastructure
87 and poor maternal, neonatal and child health (MNCH) services. As a result of strong commitment and
88 collaboration among the government and organizations from across civil society, the private sector and
89 the general public, Liberia made notable gains towards re-establishing peace and security, revitalizing
90 the economy, strengthening governance, and rebuilding health infrastructure, including MNCH services
91 ³. Bornemisza, et al. ⁴ describe how the post-conflict period provides a unique opportunity for countries
92 to address problems with their health care systems, as it is easier to create widespread change during a
93 rebuilding period. Thus, identifying the specific factors that enabled Liberia to rapidly improve MNCH
94 services after the civil crisis can inform other countries coming out of conflict or looking to make large-

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3 95 scale changes. In addition, Liberia could use information from its post-conflict successes to inform and
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5 96 contribute to its own rebuilding efforts after the 2014-2015 Ebola virus epidemic.
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8 97 A growing body of literature on MNCH in Liberia explores the country's efforts to implement
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10 98 MNCH interventions and expand access to care. Little research was published during the civil crisis and
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12 99 MNCH studies since have been primarily localized or quantitative⁵⁻¹⁵, focusing on access and utilization
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15 100 of specific MNCH interventions. Much of the qualitative or mixed-methods literature from Liberia to-
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17 101 date has focused on maternal and reproductive health¹⁶⁻¹⁹. Only one of the mixed-methods studies from
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19 102 Liberia evaluated integration and delivery of MNCH services²⁰. A few studies have reported on positive
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21 103 outcomes of specific interventions related to mobile data collection and monitoring^{21 22}, and training of
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23 104 community health workers²³ and midwives to deliver MNCH interventions at the community level^{24 25}.
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26 105 There have also been recent studies examining service usage, links between aspects of the healthcare
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28 106 system and the West African Ebola outbreak²⁶⁻²⁹. There thus remains much to be understood about
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30 107 implementation of MNCH interventions and services and progress in reducing under-five mortality.
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33 108 While case studies from other countries making significant gains in child survival such as Niger, Uganda,
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35 109 Malawi, Ethiopia, Rwanda, and Tanzania³⁰⁻³⁴ have evaluated system-level factors contributing to their
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37 110 success, only Tanzania included qualitative information from individuals attempting to access services for
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39 111 themselves or their children.
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42 112 To contribute to the growing literature on how progress in reducing under-five mortality can be
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44 113 achieved in resource-limited countries, we conducted an in-depth case study from Liberia as part of a
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47 114 larger study seeking to understand the factors influencing progress in child survival in the Africa region
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49 115 among countries that were on-track (Liberia and Zambia) and not on-track (Kenya and Zimbabwe) to
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51 116 meet MDG#4.³⁵⁻³⁸ The period of interest was from the beginning of the MDG movement in 2000 through
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54 117 2013 when the study was initiated. Our primary objective in the Liberia case study was to examine in-
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3 118 depth the specific factors influencing child survival and attainment of MDG#4 in a post-conflict setting in
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5 119 sub-Saharan Africa. By evaluating national policies and strategies, qualitative data, and quantitative
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7 120 indicator data we identified several overarching factors consistently reported to have improved access
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9
10 121 and utilization of care for children under-five, and reduced under-five mortality in Liberia.
11

12 122 **METHODS**

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15 123 Our case study utilized country-level indicator data for the years closest to 2000, 2005, and 2013
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17 124 (details below), a review of national policies and strategies issued between 2007 and 2013, following the
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19 125 civil conflict, and key informant interviews and focus groups with community women conducted in 2013.
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23 126 **MNCH indicator data**

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26 127 Prior to 2000, country-level data for core MNCH indicators monitored by Countdown to 2015
27
28 128 were not reliably available from many African countries, including Liberia. Most of Liberia's indicator
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30 129 data reported here were obtained from the World Bank Data Catalogue³⁹, a repository of national,
31
32 130 regional, and global indicator data compiled from officially-recognized sources, including national
33
34 131 Demographic and Health Surveys (DHS) and other national surveys. Data for indicators not readily
35
36 132 available from the World Bank Data Catalogue were obtained from the 2007 and 2013 Liberian DHS^{40 41}.
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40 133 We included indicator data most closely corresponding to the beginning and end of the study
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42 134 period to enable description of trends during the period. No DHS was conducted in Liberia between 1986
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44 135 and 2007 due to the civil war, resulting in substantial missing data for the time period around 2000. We
45
46 136 therefore also included 2007 DHS data to better visualize changes over time. Estimates were not always
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48 137 available for exact years 2000, 2007, and 2013, but we used data that were available within a one to
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50 138 two-year window (see Fig 2).
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3 139 **Review of MNCH policies and strategies**
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5 140 An information abstraction guide based on relevant global strategies related to child survival⁴²⁻⁴⁷
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7 141 was developed to guide the document procurement and review process according to the following eight
8
9 142 content areas: 1) Health care system (including leadership, structure, human resources for health, access
10
11 & utilization, monitoring & evaluation, and accountability), 2) National health strategies and policies (and
12 143 regulations and laws, when applicable), 3) MNCH interventions, 4) Clinical standards and guidelines, 5)
13
14 144 Commodities and essential medicines, 6) Financial flows and resources, 7) Effective partnerships, and 8)
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16 145 Other contextual factors (e.g., conflict, political environment, sanitation and hygiene, nutrition and food
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18 146 security, education, and human rights). When reviewing documents for information pertaining to the
19
20 147 eight content areas, answers to the four overarching questions presented in Table 1 were sought from
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22 148 each document.
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28 150 Policies and strategies pertaining to overall national health, MNCH, and those from other sectors
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30 151 related to MNCH (e.g., education, water and sanitation, and agriculture and nutrition) were obtained
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32 152 from the WHO African Region office, the WHO country focal points for Liberia, and Liberia's Ministry of
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34 153 Health (MOH; formerly Ministry of Health and Social Welfare). These documents were reviewed and any
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36 154 additional documents referenced and deemed important for the review (according to the abstraction
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38
39 155 guide) were obtained from WHO or MOH. The final list of reviewed documents can be found in Table S1.
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156 Table 1. Overarching questions to explore the eight content areas as related to child survival during the review of national health policies and
 157 strategies, key informant interview, and focus groups with community women.

Overarching questions for review of national policies and strategies	Overarching questions explored with key informants	Overarching questions explored with community women
<p>What policies and strategies related to child health were in place between 2000 and 2013 (including changes during this period)?</p> <p>What challenges were stated as hindering progress towards MDG#4?</p> <p>What facilitators were stated as enabling progress towards MDG#4?</p> <p>What plans for change or improvements were either implemented after 2013 or were proposed as a measure to improve child survival?</p>	<p>What issues (positive or negative) exist related to program evaluation, access and utilization, coverage, impact, and sustainability, as appropriate?</p> <p>What is your knowledge of and experiences with MNCH across the <i>health care continuum</i> (prenatal care through age 5 years)?</p> <p>What is your knowledge of and experiences with MNCH across the <i>health system continuum</i> (community to tertiary hospitals)?</p>	<p>What are the barriers and facilitators to accessing and utilizing MNCH services, including cultural and community factors?</p> <p>What have been your experiences with MNCH across the <i>health care continuum</i>?</p> <p>What have been your experiences with MNCH across the <i>health system continuum</i>?</p>

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3 158 Each document was reviewed by two authors (MAB, CAH) and information was recorded and
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5 159 summarized according to the abstraction guide. To avoid biased interpretation of the information
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7 160 documented, the abstracted information was reported as it was stated in the original source, and efforts
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10 161 were made not to overstate or minimize the original information or add commentary not contained in
11
12 162 the source.

15 163 **Qualitative study procedures**

18 164 Study location and participants

20 165 Because major differences in MNCH often exist between urban and rural areas, participants for
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22 166 the qualitative study were included from both urban and rural areas. The design of the parent study
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24 167 (consisting of four country case-studies) used country DHS to compare region-specific under-five
25
26 168 mortality rates and declines in mortality over the study period. Urban and rural sites for the qualitative
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28 169 study were to be selected from the region or county whose annual rate of reduction in under-five
29
30 170 mortality most closely matched that of the nation as a whole. In the case of Liberia, the 1986 DHS only
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32 171 reported mortality for three counties, while the 2007 DHS reported mortality rates for Monrovia and six
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34 172 regions comprised of three counties each^{41 48}. As such, specific locations representative of Liberia's
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36 173 progress as a nation could not be conclusively identified. Following discussions with the in-country
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38 174 Primary Investigator (SBK) Monrovia (Montserrado County) was selected as the urban location with
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40 175 focus groups conducted in the Paynesville and New Kru Town areas, and the areas in and around
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42 176 Gbarnga (Bong County, North Central region) were chosen as the rural location with focus groups
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44 177 conducted in Gbarnga and Totota. While we cannot ensure these locations experienced declines in
45
46 178 under-five mortality similar to Liberia as a whole, the other three country case studies were also largely
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48 179 conducted in the capital (urban site) and a nearby rural region^{35 36 38}. Bong County was selected because
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3 180 it was reasonably accessible for conducting the study in a timely manner and was not markedly different
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5 181 from other areas of the country in terms of demographics and health infrastructure.

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7 182 Data were obtained from semi-structured, key informant interviews with Ministry of Health
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9 183 (MOH) officials (N=11 individuals interviewed), donor organizations (N=8), community-based
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11 184 organizations (CBO) involved in MNCH (N=14), and health care workers (HCW) (N=14). Data were also
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13 185 obtained from four focus group discussions, two in Monrovia (N=16 total participants) and two in Bong
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15 186 County (N=21), with women who have experience accessing MNCH services. Interviews and focus groups
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17 187 were conducted between October 30 and December 19, 2013.

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22 188 Eligibility criteria and identification of study participants

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25 189 All participants, whether key informants or focus group women, were eligible for the study if
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27 190 they met the following criteria: 1) being 18 years of age or older, 2) having adequate knowledge or
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29 191 experiences related to childhood survival specified for each participant group below, 3) speaking English
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31 192 or Liberian English, and 4) being able to provide written informed consent. Specific inclusion criteria for
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33 193 each key informant group included the following: national or provincial-level officials working in
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35 194 government-level health care system administration, policy-making, program development, leadership,
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37 195 or any aspect of MNCH (MOH officials); directors, managers, or other leaders of entities providing
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39 196 financial or other aid for MNCH services, or international or national organizations focusing on MNCH or
40
41 197 having MNCH as one component of their mission (Donor organizations); directors, leaders, or managers
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43 198 working for a CBO involved in or providing referrals to MNCH services; and professionally trained
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45 199 physicians, nurses, clinical officers, or other health-related staff working in a health facility providing
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47 200 MNCH care (HCPs).

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52 201 Similar numbers of participants from each key informant group were enrolled, and a range of
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54 202 ages, work experiences, and positions/roles within each group was sought using department registers

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3 203 when available. Additionally, efforts were made to balance the number of urban and rural participants
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5 204 among the HCWs and CBO workers. Lists of potential key informants from each group were developed
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7 205 by the in-country research team with assistance, as needed, from the WHO National Professional Officer
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9 206 for Family Health and the MOH Deputy Programme Manager for the Expanded Program on
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11 207 Immunizations. A letter signed by an official from the MOH was sent to each potential key informant
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13 208 participant informing them of the purpose of the study, risks and benefits of participation, and
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15 209 describing the interview process. These were followed-up with a phone call or email to those interested.
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17 210 The final number of key informant interviews conducted was arrived at through a combination of
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19 211 approaches. Due to study logistics, we set a minimum number of six interviews to be conducted with
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21 212 both MOH and donor organization representatives and a minimum of twelve interviews (have urban,
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23 213 half rural) to be conducted with both HCWs and CBO representatives. In an effort to achieve saturation,
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25 214 we prioritized diversity in the types of key informants we reached (Table S2). The in-country PI and
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27 215 research assistants monitored data collection and saturation.
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35 218 Women were recruited to participate in focus groups using informational flyers or
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37 219 advertisements posted in different health centers and surrounding communities. As with the key
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39 220 informants, a balance was sought in the level of education and participants with live and deceased
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41 221 children, as well as a diversity of experiences and opinions regarding access and utilization of MNCH
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43 222 services. The number of focus groups was determined at the outset of the study, and constrained by
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45 223 study logistics. Written informed consent was obtained from all enrolled participants. Community
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47 224 women (Table S3) were provided a small monetary compensation for their participation.
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52 226 Interview and discussion guides
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3 227 Interview guides for key informants and discussion guides for focus groups with community
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5 228 women were developed, pilot tested through cognitive interviewing⁴⁹, and revised as needed. The
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7 229 guides focused on experiences with MNCH services and barriers to and facilitators for improving child
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9 230 survival (Table 1), pertaining to the eight content areas evaluated during the review of national health
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11 231 policies and strategies. Not all content areas were appropriate for each key informant group, but each
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13 232 topic was asked of at least two of the four groups. The content areas and overarching questions were
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15 233 developed to provide structure across the four country case studies of the parent study. However, they
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17 234 were intentionally broad to provide sufficient flexibility for participants within and across countries to
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19 235 discuss the issues most relevant to them. Focus group discussions with community women focused only
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21 236 on the health care system, MNCH interventions, medicines, and contextual factors content areas. While
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23 237 participants could discuss the entire period from 2000 forward, most participants recalled more recent
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25 238 information and experiences.

29 30 239 Data collection

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33 240 Prior to conducting interviews and focus group discussions, participants completed a brief survey
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35 241 to obtain basic demographic information, MNCH-related work experience (key informants only),
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37 242 socioeconomic information (focus group women only), and/or information on births and under-five
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39 243 deaths in the household (focus group women only).

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43 244 Key informant interviews were conducted in English by one research assistant using the
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45 245 appropriate interview guide and were audio recorded. Key informants were encouraged to provide their
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47 246 perspectives openly and discuss a range of barriers and facilitators to child survival. Interviews typically
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49 247 lasted 60-90 minutes. The focus group discussions were conducted in Liberian English and were audio
50
51 248 recorded. Two Liberian research assistants (one male and one female) were present at each focus group
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53 249 to facilitate discussion and note-taking. Focus group participants were encouraged to provide their

250 opinions openly, and research assistants were trained in techniques to promote open discussion. Focus
251 groups typically lasted between 1 ½ to 2 hours.

252 The researchers on this study included individuals with knowledge and experience of MNCH at
253 the national and international levels, and who had prior experience with health research in Liberia. Key
254 research team members had prior experience with qualitative and quantitative research methods and
255 research ethics. An in-person methods training was held to ensure high quality data across sites. Ongoing
256 remote training and trouble-shooting was provided to the research team during the piloting and data
257 collection stages of the study. To promote reflexivity, preliminary results were discussed at a workshop
258 held after data collection and preliminary analysis was completed.

259 Following completion of the interviews and focus groups, audio recordings were transcribed by
260 the research assistants and field notes incorporated into the transcript. Transcripts were coded and
261 analyzed using the software Atlas.ti (Atlas.ti Scientific Software Development GmbH, Berlin, Germany)⁵⁰.
262 In keeping with a framework approach often used for qualitative, multidisciplinary health research,⁵¹⁻⁵³
263 deductive themes were determined *a priori* based on our conceptual framework of overarching
264 questions. Additional inductive themes were also identified upon review of the transcripts. Deductive
265 codes provided a useful way of comparing themes and concepts within and across countries. Text was
266 coded and reviewed for patterns of consistency, variation, relationships between themes and exemplary
267 cases or quotations^{54,55}. Ethical approval was obtained from the Vanderbilt University Medical Center
268 and the University of Liberia-Pacific Institute for Research and Evaluation.

269 **Patient involvement**

270 Patients were not involved in the design of this study. Results were disseminated to Ministry of
271 Health and WHO representatives from Liberia, and a presentation and report detailing results were
272 made available to these representatives to aid further dissemination to other stakeholders.

273 RESULTS

274 MNCH coverage Indicators

275
276 Indicator coverage data from 2000 were not available for six of the thirteen core indicators (Fig
277 2). Liberia has improved coverage of nine of these indicators during the study period. Highest current
278 indicator coverage is seen for pregnant women receiving antenatal care (ANC) (96%), vitamin A
279 supplementation (88%), pregnant women receiving at least four ANC visits (78%), and improved water
280 sources (75%; Fig 2). Coverage was below 50% for improved sanitation (17%), postnatal visits within two
281 days for deliveries (35%), use of insecticide-treated bednets (38%), and diarrhea treatment (46%; Fig 2).

282 Figure 2 here. **National document review and qualitative study**

283 National Prioritization of MNCH

284 Both national documents and key informants at nearly all levels highlighted the strong
285 commitment the Liberian government made to re-build the health care system soon after the civil war
286 ended. Key informants and national documents also described how MNCH was prioritized, not just
287 within the MOH, but also by top leadership throughout all sectors of the government. As an example of
288 Liberia's high level commitment to MNCH, key informants described how maternal and neonatal deaths
289 were reported directly to Liberia's president. Routine audits of maternal and neonatal deaths were
290 undertaken by county health boards to identify problems with care, and improve accountability and
291 oversight. Community women rarely specifically commented on the government's prioritization of
292 MNCH, but some did express appreciation for the government's role in rebuilding services after the
293 conflict. This prioritization of MNCH by multiple levels in the government is illustrated in the quotations
294 below:

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2
3 295 “I mean it has been a painfully slow process...to get government to that level of commitment but
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5 296 a lot of progress, a lot of gain has been made and I can tell you for instance now the President of
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7 297 Liberia is the president of the commission for women health in Africa and that’s under the WHO-
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10 298 AFRO, I can tell you that the government...had made maternal and newborn health one of the
11
12 299 conditions that will undergo surveillance, meaning that...maternal and newborn death should be
13
14 300 reported.” (49 year old, male donor partner)

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16
17 301 “...I think all the things we do medication and everything government has been involved [in]...if
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19 302 you have anybody dying from giving birth they have this audit in this particular team that reports
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21 303 directly to the President of Liberia, so they are even involved in it...” (35 year old, female from
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23 304 CBO partner)

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27 305 “[NGOs and the government] are giving us knowledge [on] how to take care of ourselves and
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29 306 what to do when you are pregnant, where to go and where not to go and what for you to
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31 307 eat...things have improved, because we having NGOs, we having government, we having UN,
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33 308 many people coming in they helping us too. So things have improved bit by bit.” (39 year old,
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35 309 rural woman with 4 children)

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39 310 Although child health has been recognized as an important priority by both the Liberian
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41 311 government and donor partners, national health documents and key informant interviews all indicated
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43 312 consistent concern that Liberia’s high dependence on donor aid is unsustainable. Many key informants
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45 313 felt that the Liberian government’s relationship with donors had evolved such that donors no longer
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47 314 drove the agenda, but rather accepted guidance from the government on priority areas and needs that
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49 315 the donors could assist with. However, there were also some who felt that donors continued to have too
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51 316 much involvement because of the high levels of funding they provided. Due to strong donor funding and
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53 317 some government funding, most MNCH services were free during much of the study period, which key

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3 318 informants and community women felt contributed to increased access and utilization. However, key
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5 319 informants and national documents indicated that the government of Liberia needs to institutionalize
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7 320 services currently provided by external partners and take more financial responsibility for the health
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9 321 sector. The government was praised by a few participants for taking on a greater share of
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11 322 responsibilities, such as vaccine procurement, but many acknowledged that the government needed to
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13 323 sustain their involvement and investment to ensure gains were sustainable.
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17 324 “...we are donor dependent; the sources of funding either from the donor or the GOL
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19 325 [Government of Liberia] but what comes into the ministry for maternal and child health issue is
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21 326 very small but the input that partners are making if you count it, it’s very huge. So we think that
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23 327 for sustainability the government needs to play more roles because if these partners leave, the
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25 328 gains that we are making, to sustain it might be difficult...” (46 year old, female MOH official)
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28

29 329 The Development and Implementation of Integrated Packages of Services 30 31

32 330 Key informants indicated that the MOH did a good job of implementing extensive reforms of the
33
34 331 health system soon after the civil war, and continuous attempts to evaluate and update policies and
35
36 332 strategies to make gradual improvements. An often-cited example by key informants of this process was
37
38 333 the implementation of integrated packages of services, detailed in the quotations below:
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41 334 “...I think there is an enabling environment from the government through the Ministry of Health
42
43 335 that is in place through the development of the ten years plan and the expanded program which
44
45 336 is the EPHS [Expanded Package of Health Services], which addresses child health and maternal
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47 337 health, so first there is a will on the part of the government to address child health and maternal
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49 338 health...” (49 year old, female donor partner)
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3 340 “...the Ministry of Health, from the beginning a postwar country had a policy first that was
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5 341 guiding the process; the BPHS [Basic Packages of Health Services]...So it had bases on how people
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7 342 should implement the policy and also as time went by, maternal services improved over time
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10 343 based on evaluation from the Ministry of Health and Social Welfare through their annual
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12 344 accreditation looking at service delivery.” (35 year old, male donor partner)
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15 345 Liberia’s National Health Policy and Plan⁵⁶ first focused on establishing the Basic Package of
16
17 346 Health Services (BPHS). National documents and key informants attributed rapid scale-up of MNCH
18
19 347 interventions immediately following the civil war to the effective framework set forth by the BPHS.
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21 348 According to national documents, the BPHS also aimed to improve distribution and supervision of
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23 349 healthcare providers through establishment of a salary scale, standardized job descriptions, and
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25 350 supervision tools for all cadres. Although the BPHS is credited with restoring MNCH service delivery
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27
28 351 across Liberia, several key informants stated that the BPHS did not adequately integrate services across
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30 352 different sectors of MNCH, which they felt hindered delivery of maternal health and family planning,
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32 353 nutrition and PMTCT. Additionally, components of the BPHS intended to improve human resources for
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34 354 health were not fully implemented or did not appear to have the intended impact, as many key
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37 355 informants and community women cited a lack of qualified and quality providers.
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40 356 Recognizing the shortcomings of the BPHS, the National Health and Social Welfare Policy and
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42 357 Plan⁵⁷ was developed and established the Essential Package of Health Services (EPHS) which aimed to
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44 358 scale-up interventions (especially MNCH interventions), reduce inequities, improve collaboration across
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46
47 359 different sectors, and improve quality at secondary and tertiary healthcare centers. The EPHS also sought
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49 360 to increase the number of skilled workers available for labor and delivery to ensure that emergency
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51 361 obstetric and neonatal care (EmONC) is available at all facilities. Key informants were quite positive
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54 362 about the EPHS, feeling that it had improved collaboration between sectors and had improved quality of
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3 363 care in some areas. Some key informants also felt that the clearer language in the policy documents
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5 364 enabled the government to better establish expectations and hold partners accountable when
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7 365 implementation goals were not met.
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10 366 "...from the BPHS to EPHS, it was EPHS they were able to strengthen that MCH part to include in
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12 367 addition to nutrition, adolescence, reproductive health care and all of that sexual health but in
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14 368 the past, those were very weak and gray areas; as long as the policy did not address them, they
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16 369 became difficult for anyone to hold a partner accountable for any implementation. Uh, now, the
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18 370 ministry has included that and there are more services." (47 year old, male CBO partner)
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22 371 However, some key informants felt that the EPHS had not been completely implemented at all
23
24 372 levels, particularly the primary care level, due to lack of resources, both human and financial. The
25
26 373 incomplete implementation limits not only delivery of MNCH interventions, but also the collaboration
27
28 374 and coordination the EPHS was intended to promote. In addition, both key informants and some
29
30 375 community women described continued shortages of healthcare providers, especially those trained in
31
32 376 delivery-related interventions, certified midwives, and pediatric specialists outside the capital of
33
34 377 Monrovia. As illustrated below, community women and key informants noted that limited availability of
35
36 378 MNCH providers and poor attitudes of providers remained a barrier to utilizing and accessing care.
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40
41 379 "...When I gave birth, the girl that attended to me because she left, her shift was over...that night
42
43 380 I could die because I started bleeding right after giving birth. But because my friend was a nurse
44
45 381 she went there and attended to me that night. Those that were on shift that night... never had
46
47 382 time for me because nothing was there for me to tip in, so they just acted careless on [with] me."
48
49 383 (38 year old, urban woman with 4 children)
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53 384
54 385 "Clinics are...not running 24/7 services, we have heard these challenges from them, people go
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3 386 overnight with complaints and the health care provider says I am not paid for overnight services
4
5 387 so you have to wait until tomorrow; so lack of motivation at the service provider end is also
6
7 388 impeding the process.” (37 year old, male CBO partner)
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10 389
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12
13 390 Although key informants were concerned about incomplete implementation of the EPHS, they
14
15 391 attributed improvements in malaria, PMTCT services, nutrition and reproductive health to the enhanced
16
17 392 integration between sectors that the EPHS provided, as illustrated below. Community women did not
18
19 393 specifically describe implementation of the EPHS or differentiate between levels of the healthcare
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21 394 system, but did discuss the quality of care they received. Specifically, women felt very positive about the
22
23 395 care received during pregnancy and delivery, as well as educational and preventive services.
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27 396 “...I think it has changed...in the past we had the BPHS that provided minimum service at the
28
29 397 health facility where when the pregnant woman comes, they only check them and when they
30
31 398 have malaria, they treat them and they go home. But this time around, the BPHS has been
32
33 399 modified to EPHS and where, we look at a full package, the standards have improved, the
34
35 400 services have improved and they receive a whole package and deliver it to the mother...
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37
38 401 [including] PMTCT services, immunization, nutrition, and other laboratory findings so as to
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40 402 reduce the number of visits, she has to do at the health facility.” (33 year old, male MOH official)
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43

44 403 “...the nurses and the doctors especially at the hospital here, whenever they carry pregnant
45
46 404 woman there, they always cater to the person and talk [to] the person in a polite manner, try to
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48 405 help the person...They always treat us free and at time [delivery] they give baby’s clothes free of
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50 406 charge.” (43 year old, rural woman with 6 children)
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3 408 “...when you give birth and the baby is growing up, you don’t have to wait for the child to fall sick
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5 409 before you carry the child to hospital. You can take the child to hospital so the child will get
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7 410 drugs [anti-malaria prophylaxis]...” (35 year old, urban woman with 4 children)
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10 411
11 412 Community outreach and service delivery
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14 413 Liberia’s use of community outreach and service delivery was a third overarching factor
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16 414 identified as facilitating achievement of MDG#4. The national Community Health Services Policy first
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18 415 issued in 2008 and revised in 2011⁵⁸ outlined a standard set of outreach, health promotion and referral
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20 416 services. This policy also specified the roles and responsibilities of community-based staff including
21
22 417 general community health volunteers (GCHVs) and Trained Traditional Midwives (TTMs). It further
23
24 418 outlined how they should be distributed geographically, supervised, evaluated, and that TTMs are to be
25
26 419 compensated with monthly salaries while GCHVs work as volunteers but receive an incentive package.
27
28 420 Both key informants and community women were positive about their efforts at the community level,
29
30 421 recognizing how these cadres enhance referrals from the community to healthcare facilities and follow-
31
32 422 up with mothers and children in the community after they return home. GCHVs and TTMs were also
33
34 423 highly valued by community women for their assistance with the outreach campaigns--“Reach Every
35
36 424 District” (RED) and “Reach Every Pregnancy” (REP)-- to improve immunization coverage and maternal
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38 425 health, respectively. Both key informants and community women further described that GCHVs and
39
40 426 TTMs had likely increased coverage of antenatal and post-natal care by connecting women with the
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42 427 healthcare system earlier in pregnancy and increased immunization coverage through mobile
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44 428 vaccination sites, and improved community-based education and communication.
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49
50 429 “...the vaccine team most of the time come around to give our children vaccine and deworm
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52 430 them with the medicine. At time we can see some people with the megaphone
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54 431 educating...pregnant women on how to take care of your children and even how to take care of
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3 432 your community. As for the health campaign we can see them and we can benefit from them.”

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5 433 (38 year old, urban woman with 3 children)

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8 434 “Number one thing that is trying to work well is the TTMs and GCHVs, they are trying their best

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10 435 with the referrals. They get any patient in the community, they bring them here... we have family

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12 436 planning, we have EPI under MCH, we have PMTCT, ANC, labor and delivery, post-partum care

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14 437 provided...The only problem we have with our GCHVs is that they are saying they are not been

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16 438 compensated so we don't expect them to work full time.” (43 year old, female health care

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18 439 worker)

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22 440 While attributing success at the community level to the efforts of GCHVs and TTMs, study

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24 441 participants also felt these staff needed better compensation beyond what is currently provided to

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26 442 enable them to work more often. The insufficient number of GCHVs and TTMs was also cited as a

27
28 443 challenge affecting availability of health services. Key informants and national documents noted that due

29
30 444 to limited human and financial resources, local health clinics were not always staffed and community-

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32 445 based interventions such as the RED and REP campaigns had not been implemented or adequately

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34 446 supported in all areas.

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38 447 “...I remember some time ago they were trying to integrate the...reach every pregnant women;

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40 448 reach every district...but for the reach every pregnant woman actually it is not working 100%. If I

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42 449 will have to grade it may be it is working around 40 to 45% because of may be some supplies

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44 450 that supposed to be given or put into place it is not into place...” (34 year old, female CBO

45
46 451 partner)

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50 452 **DISCUSSION**

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3 453 This case study identifies three components that have likely contributed to Liberia's rapid post-
4
5 454 conflict decline in under-five mortality and attainment of MDG#4. First, the Liberian government made
6
7 455 re-establishment and funding of MNCH a top priority as it rebuilt its health system after the civil war.
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9 456 Second, the development and implementation of integrated packages of services, first the BPHS followed
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11 457 by the EPHS, enabled Liberia to restore basic MNCH services and scale-up interventions at all levels of
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13 458 the healthcare system. The development and implementation of the BPHS and EPHS also demonstrated
14
15 459 Liberia's ability to evaluate and re-work policies and strategies. The EPHS fostered further integration
16
17 460 and collaboration across multiple sectors, which allowed for expansion of PMTCT, nutrition, and other
18
19 461 MNCH services. The EPHS also sought to improve the availability of trained health workers and fully
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21 462 functional health units, although challenges persisted despite these efforts. Third, provision of services at
22
23 463 the community level, such as outreach campaigns and use of GHCVs and TTMs to deliver basic MNCH
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25 464 interventions, contributed to improved coverage of ANC, post-natal care, and immunizations, and also
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27 465 improved access and continuity of care in post-conflict Liberia by strengthening referrals between the
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29 466 community and healthcare facilities.
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35 467 Liberia utilized a healthcare system recovery approach that has shown promise in other post-
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37 468 conflict or conflict-affected settings. Specifically, Kruk, et al. (2010) emphasize the need for strong
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39 469 national leadership and governance that makes restoration of basic health services a top national
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41 470 priority. They also documented that, when a national government makes a strong commitment to
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43 471 providing healthcare to the most vulnerable populations (such as women and children), this commitment
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45 472 can contribute to the country's long-term stability and recovery efforts. A basic package of health
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47 473 services enabling rapid roll-out and scale-up of MNCH and other primary health services has also been
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49 474 deployed with some success in Afghanistan, South Sudan, Rwanda, and Bosnia and Herzegovina⁵⁹⁻⁶³, and
50
51 475 is specifically recommended for conflict-affected settings^{4,12}. These packages of services typically include
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53 476 key MNCH interventions, nutrition, and treatment for communicable diseases (such as TB and HIV)⁵⁹⁻⁶⁵.
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3 477 Afghanistan, like Liberia, revised their basic package to also include additional services (for disability and
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5 478 mental health), recognizing the specific needs of their population and the gaps in their original package.
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7 479 Researchers have suggested that integrated packages of services may help in initial scale-up and
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9 480 improvements, but require additional inputs and adjustments to sustain these improvements^{59 60 62 66}.

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12 481 Community-level education, empowerment, and outreach are also recommended to improve
13
14 482 utilization and access to basic interventions and improve referrals from the community to the facility
15
16 483 levels^{4 67-70}. Expanding cadres of traditional birth attendants and community health workers has been
17
18 484 found to be particularly key in restoring maternal and neonatal services in conflict-affected settings^{59 71-}
19
20 485 ⁷⁵. Community health workers and community-level outreach and service delivery has also been a key
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22 486 factor in the successes of other countries successfully reducing child mortality^{30-34 38 76}. Although many
23
24 487 conflict-affected settings have difficulties with referrals^{67 77 78}, this is one area where Liberia appears to
25
26 488 have made great progress through their use of GCHVs and TTMs, as described by key informants and
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28 489 community women.

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32 490 Although Liberia has made significant progress in MNCH, national documents and study
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34 491 participants noted a number of challenges that persist and need to be addressed as Liberia moves
35
36 492 forward to achieve their post-2015 goals⁷⁹. This includes their severe shortage of healthcare providers,
37
38 493 particularly community-based midwives and child health providers in rural areas. The lack of healthcare
39
40 494 providers and challenges associated with training and retaining general and MNCH providers is well-
41
42 495 documented in the literature from other conflict-affected countries where brain-drain is common during
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44 496 and after conflict^{4 12 59 67 69 80-83}. Another weakness described in the study is Liberia's high dependence on
45
46 497 donor aid to provide many of the MNCH services. Although heavy reliance on donor aid is consistent
47
48 498 with other conflict-affected countries, there is little consensus on how donors can best support post-
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50 499 conflict countries and few recommendations as to how and when post-conflict settings should make the
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52 500 transition from donor-provided services to government-provided services⁸⁴⁻⁸⁶. An emphasis on

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3 501 increased government stewardship of the healthcare system, particularly with respect to the
4
5 502 government taking a key role in determining partner expectations and roles and contracting directly with
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7 503 partners comprises one set of recommendations.⁸⁷⁻⁸⁹ Liberia's relationships with donors appears to have
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9 504 evolved in line with this recommendation, however additional progress is still needed. The literature also
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11 505 cautions that the time horizon for moving away from donor dependence in conflict-affected states may
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13
14 506 be lengthy and is not necessarily linear as a state's stability may not always follow a linear trajectory.^{85,87}
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16 507 This study provides one of the few country-case studies to assess progress towards achieving
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18 508 MDG#4. Perhaps more importantly, it provides much needed insight into MNCH infrastructure and
19
20 509 experiences from an understudied, post-conflict, yet highly successful African country. This case-study
21
22 510 utilized a number of data sources, including national indicator data, country-authored health policies and
23
24 511 strategies, and qualitative data from key informants with different roles in MNCH and four focus group
25
26 512 discussions with women from urban and rural areas. By bringing together diverse sources of data, this
27
28 513 study was able to assess the national-level measures used to enhance child survival and the facilitators
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30 514 and challenges that affected full implementation and impact.
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34 515 There are limitations in our study. For the review of national MNCH policies and strategies, new
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36 516 policies and strategies were not issued until after 2007 due to the civil war. While these documents
37
38 517 contained a retrospective assessment of the preceding period, assessments of the impact of more recent
39
40 518 policies or strategies were not yet available. Moreover, country policies and strategies covered different
41
42 519 and sometimes overlapping time periods, making it difficult to distinguish current from outdated
43
44 520 information, and whether a stated plan had been implemented unless stated. Input from co-authors
45
46 521 affiliated with the WHO and the MOH helped to clarify uncertainty.
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50 522 With regards to the interviews and focus groups, this study was limited to a non-random sample
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52 523 of participants and conducted in two counties (one urban, one rural). Changes in under-five mortality in
53
54 524 these areas may not reflect changes at the national level and local views and experiences may not reflect

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3 525 those from other areas. However, participants were selected to represent five different cadres of
4
5 526 individuals who could share a diversity of MNCH experiences, including some key informants with
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7 527 national-level responsibilities and 37 women from the community. Most of the participants recalled their
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10 528 current experiences and opinions on MNCH, and we gained less insight as to long-term changes.

11
12 529 Our study contributes to the growing literature on effective approaches to scaling-up availability
13
14 530 and use of MNCH services in conflict-affected settings. The factors identified as contributing to Liberia's
15
16 531 success in reducing under-five mortality can be applied in the many other countries recovering from
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18 532 conflict, and is relevant to Liberia's recovery from the 2014-2015 Ebola epidemic. To further improve the
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20
21 533 delivery of essential health services and reduce under-five mortality in the post-2015 era, Liberia must
22
23 534 maintain the health and welfare of pregnant women and children as a top priority, conduct
24
25 535 comprehensive evaluation and enhancement of programs and interventions, increase government
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27
28 536 responsibility for service delivery to reduce donor dependence, and ensure that sufficient human and
29
30 537 financial resources enable MNCH service delivery close to the population.

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53 54 554 Authors' contributions

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3 555 Brault: Involved in conceptualization of research, development of methodology, data collection, data
4 556 analysis, data management, and manuscript development.

5
6 557 Kennedy: Involved in development of methodology, data collection, data management, and manuscript
7 558 development.

8
9 559 Haley: Involved in conceptualization of research, development of methodology, data collection, data
10 560 analysis, data management, and manuscript development.

11
12 561 Clarke: Involved in development of methodology, provision of study resources, and manuscript
13 562 development.

14
15 563 Duworko: Involved in development of methodology, provision of study resources, and manuscript
16 564 development.

17
18 565 Habimana: Involved in conceptualization of research, development of methodology, funding acquisition,
19 566 and manuscript development.

20
21 567 Vermund: Involved in conceptualization of research, development of methodology, funding acquisition,
22 568 and manuscript development.

23
24 569 Kipp: Involved in conceptualization of research, project administration, development of methodology,
25 570 funding acquisition, data collection, data analysis, data management, and manuscript development.

26
27 571 Mwinga: Involved in conceptualization of research, project administration, development of
28 572 methodology, funding acquisition, provision of study resources, and manuscript development.

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31 573 Data sharing statement

32
33 574 Annual mortality estimates used in Figure 1 are publicly available, without restriction, from
34 575 http://www.childmortality.org/index.php?r=site/graph#ID=LBR_Liberia. Indicator data used for Figure 2
35 576 are publicly available, without restriction, from the World Development Index, Africa Development
36 577 Index, and Health Nutrition & Population Statistics databases of the World Bank Data Catalog
37 578 (<http://data.worldbank.org/data-catalog/>) or Liberia Demographic and Health Survey reports available at
38 579 http://dhsprogram.com/Where-We-Work/Country-Main.cfm?ctry_id=22&c=Liberia&r=1. A detailed
39 580 description of each indicator's source can be found in the supplemental material from a previously
40 581 published study (Kipp et al. BMJ Open. 2016. <http://dx.doi.org/10.1136/bmjopen-2015-007675>).

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42
43 582 Supplemental table S1 lists the national documents reviewed for the study. These were obtained with
44 583 the permission and assistance of the Liberian co-authors and do not belong to any of the individual study
45 584 authors. As such, they cannot be made available as they belong to the Ministry of Health or other
46 585 agencies and some are still in draft form. Links to publicly available documents are provided in
47 586 Supplemental table S1. For investigators wishing to obtain other policy documents used in this study,
48 587 please contact Mr. Luke Bawo, Coordinator for Research and Health Management Information System,
49 588 Ministry of Health, email: lukebawo@gmail.com; or Hon. C. Sanford Wesseh, Assistant Minister for Vital
50 589 Statistics, Ministry of Health, email: cswesseh@yahoo.com.

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52
53 590 Under the Agreement for Performance of Work with the World Health Organization (sponsor) that was
54 591 used for this study, all rights to the data collected from key informants and community women belong to

1
2
3 592 the WHO. The WHO will entertain any reasonable proposal for use of the data. Researchers who are
4 593 qualified to manage and analyze qualitative data may request these data from Dr. Phaniel Habimana,
5 594 Team Leader, Child and Adolescent Health and Nutrition, WHO Regional Office for Africa, Brazzaville,
6 595 Congo; email: habimanap@who.int.

8 596 Interview, focus group discussion, and national document abstraction guides are available upon request
9 597 from the corresponding author; email: aaron.kipp@vanderbilt.edu. These data are not considered part
10 598 of the underlying data necessary to replicate the study.

12
13 599 Figure legends

14 600 Fig 1. Under-five, infant, and neonatal mortality rates for Liberia in 1990, 2000, 2010, and 2015 (solid
15 601 circles) with annual rates of reduction (ARR) for each period (solid and dashed lines).

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18
19 603 Source: Levels and Trends in Child Mortality: Report 2015 - Estimates Developed by the United Nations
20 604 Inter-agency Group for Child Mortality Estimation ¹. Report and data accessed July 2015 from
21 605 www.childmortality.org.

22 606 Fig 2. Changes in child survival indicator coverage in Liberia, 2000, 2007, and 2013*.

23 607 *Estimates were not always available for years 2000, 2007, and 2013, in which case the nearest estimate
24 608 between 1999 and 2000, 2005 and 2007, or 2012 and 2013 was used; data were not available for the six
25 609 indicators showing an asterisk (*) during the 2000 time period.

26 610 [†]Among all births, both inside and outside a health facility

27 611 [‡]Children 12-23 months old who have received BCG, measles and three doses each of DPT and polio
28 612 vaccine (excluding polio vaccine given at birth)

29 613 [§]Children under 5 receiving oral rehydration and continued feeding

30 614 Source: World Development Indicators Data Catalogue from the World Bank

31 615 (<http://datacatalog.worldbank.org>; accessed August 2015) and Liberia DHS

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847 **Supporting Information**

848 S1 Table. Liberia policy, strategy, and other national documents reviewed

For peer review only

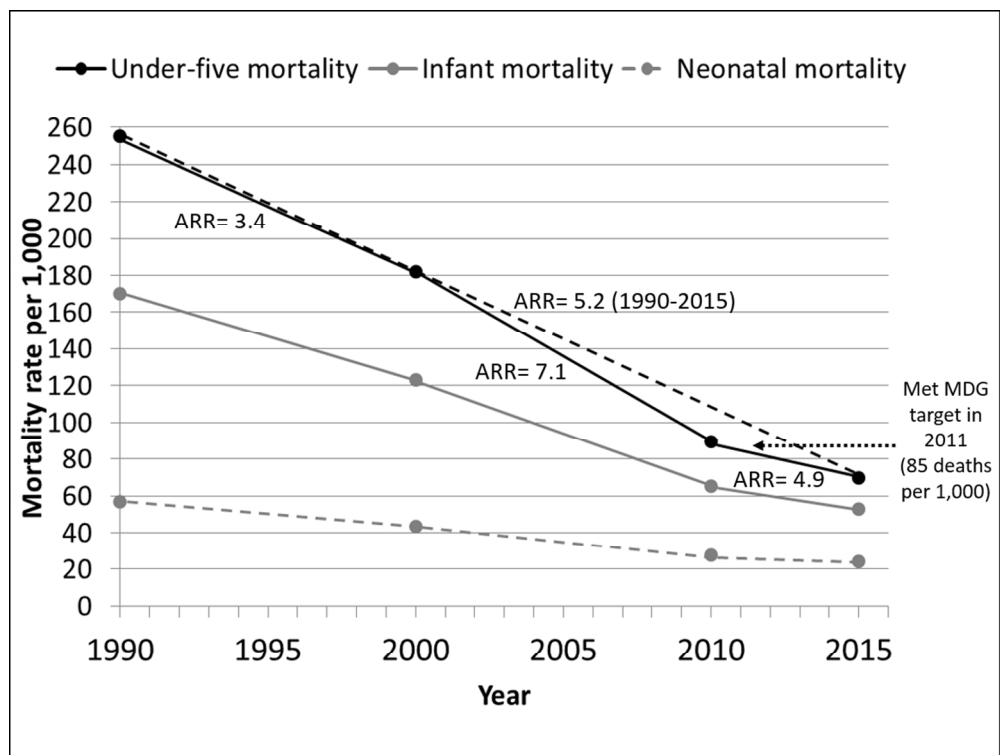


Figure 1: Under-five, infant, and neonatal mortality rates for Liberia in 1990, 2000, 2010, and 2015 (solid circles) with annual rates of reduction (ARR) for each period (solid and dashed lines).

98x74mm (300 x 300 DPI)

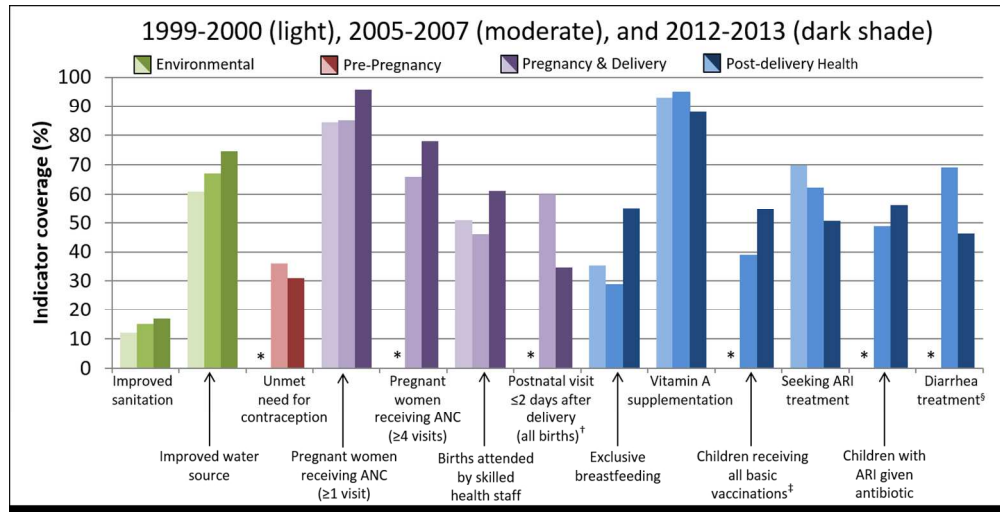


Figure 2: Changes in child survival indicator coverage in Liberia, 2000, 2007, and 2013*.

127x64mm (300 x 300 DPI)

Supplemental Table

Table S1. Liberia documents reviewed

Document title (dates if not otherwise specified in title)
Primary source documents* (Newest to oldest)
Republic of Liberia Agenda for Transformation: Steps towards Liberia Rising 2030 (2012)
Accelerated Action Plan to Reduce Maternal and Neonatal Mortality, 2012-2016
Situational Analysis of Newborn Health in Liberia (Parts A and B) (Drafts) (2012)
National Health and Social Welfare Policy and Plan, 2011-2021
Country Situational Analysis Report, 2011
Road Map for Accelerating the Reduction of Maternal and Newborn Morbidity and Mortality in Liberia, 2011-2015
Revised National Community Health Services Policy (2011)
Essential Package of Health Services: Primary Care, 2011-2021
Essential Package of Health Services: Secondary and Tertiary Care, 2011-2021
National Strategy for Child Survival in Liberia, 2008-2011
Other documents reviewed† (Newest to oldest)
Micronutrient Powder Supplementation of Young Children Linked with IYCF community promotion, 2012-2015
National Policy on Immunization, 2012
National EPI Strategic Plan, 2011-2015
National Sexual and Reproductive Health Policy (2010)
Integrated Guidelines of Prevention, Testing, Care and Treatment of HIV and AIDS in Liberia, 2010
Report on the Assessment of Infant and Young Child Feeding Practices, Policies and Programmes in Liberia 2009

*Primary documents extensively reviewed to obtain information on each content area identified in the abstraction guide

†Documents reviewed, but information on progress towards MDG#4 was sufficiently covered by the primary documents

Table S2. Characteristics of key informants in Liberia.

	Ministry of Health (N=11)		Donor organization (N=8)		Community Based Organization (N=14)		Health Care Worker (N=14)	
Sex, N (%)								
Male	8	(73)	5	(62.5)	10	(71)	5	(36)
Female	3	(27)	3	(37.5)	4	(29)	9	(64)
Age, M (IQR)	45	(38, 55)	40	(36, 49)	40	(36, 50)	45	(40, 54)
Ethnicity, N (%)								
Bassa	1	(9)	1	(12.5)	0	(0)	0	(0)
Grebo	2	(18)	1	(12.5)	1	(7)	2	(14)
Kissi	1	(9)	0	(0)	1	(7)	0	(0)
Kpelle	2	(18)	1	(12.5)	4	(29)	6	(43)
Lorma	2	(18)	0	(0)	0	(0)	1	(7)
Mano	2	(18)	1	(12.5)	4	(29)	1	(7)
Other*	1	(9)	4	(50)	4	(29)	4	(28)
Education, N (%)								
Secondary	1	(9)	0	(0)	0	(0)	0	(0)
Post-secondary	10	(91)	8	(100)	14	(100)	14	(100)
Median (IQR) years working for organization	7	(6, 9)	1	(1, 6)	5	(3, 13)	7	(2, 15)

* Other includes one each of Belleh, Dahn, Gbandi, Gola, and Kru; five foreign nationals (Ghana, Kenya, Nigeria,

Sierra Leone, and Uganda); and 3 not reported

Table S3. Characteristics of female focus group participants in Liberia.

	Rural participants (N=16)	Urban participants (N=21)
Age, M (IQR)	26 (22, 32.5)	28 (21, 38)
Ethnicity, N (%)		
Kpelle	12 (75)	1 (5)
Lorma	2 (13)	2 (10)
Bassa	0 (0)	9 (43)
Kru	0 (0)	7 (33)
Vai	0 (0)	2 (10)
Other*	2 (13)	0 (0)
Education, N (%)		
None	2 (14)	2 (10)
Primary	7 (50)	5 (24)
Secondary	3 (21)	13 (62)
Post-secondary	2 (14)	1 (5)
Travel time to health care (dry season), N (%)		
Less than one hour	15 (94)	19 (90)
One to two hours	0 (0)	2 (10)
More than two hours	1 (6)	0 (0)
Number of living children, M (IQR)	1 (1, 3)	2 (1, 4)
Age of youngest child, M (IQR)	2 yr (11 mo, 4 yr)	2 yr (1 yr, 3 yr)
Any children who died <5yrs old, N (%)		
No	12 (80)	12 (57)
Yes	3 (20)	9 (43)
Place of delivery for latest pregnancy, N (%)		

Health facility	16	(100)	17	(81)
Home	0	(0)	4	(19)
Birth attendant for latest pregnancy, N (%)				
Doctor	2	(13)	3	(14)
Nurse/midwife	14	(88)	17	(81)
Traditional birth attendant	0	(0)	1	(5)

* Other includes one each Kisii and Mandingo

Standards for Reporting Qualitative Research (SRQR)*

<http://www.equator-network.org/reporting-guidelines/srqr/>

Page/line no(s).

Title and abstract

<p>Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended</p>	<p>Page 1, lines 1-2</p>
<p>Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions</p>	<p>Pages 2-3, lines 28-52</p>

Introduction

<p>Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement</p>	<p>Pages 4-6, lines 72-119</p>
<p>Purpose or research question - Purpose of the study and specific objectives or questions</p>	<p>Page 6, lines 120-128</p>

Methods

<p>Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**</p>	<p>Page 16, lines 279-283</p>
<p>Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability</p>	<p>Page 16, lines 267-275</p>
<p>Context - Setting/site and salient contextual factors; rationale**</p>	<p>Page 10-11, lines 174- 191</p>
<p>Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**</p>	<p>Pages 7-13</p>
<p>Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues</p>	<p>Page 16, lines 285-286</p>
<p>Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**</p>	<p>Pages 7-10 and Pages 15-16</p>

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3	Data collection instruments and technologies - Description of instruments (e.g.,	Pages 7-10 and Pages 15-16
4	interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	
5		
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7	Units of study - Number and relevant characteristics of participants, documents,	Pages 7-8 and Pages 11-12
8	or events included in the study; level of participation (could be reported in results)	
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10	Data processing - Methods for processing data prior to and during analysis,	Pages 15-16
11	including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	
12		
13	Data analysis - Process by which inferences, themes, etc., were identified and	Page 16
14	developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	
15		
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17	Techniques to enhance trustworthiness - Techniques to enhance trustworthiness	Page 16
18	and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	
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Results/findings

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23	Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and	Throughout results
24	themes); might include development of a theory or model, or integration with prior research or theory	
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26	Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts,	Throughout results
27	photographs) to substantiate analytic findings	
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Discussion

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32	Integration with prior work, implications, transferability, and contribution(s) to	Throughout discussion
33	the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	
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38	Limitations - Trustworthiness and limitations of findings	Pages 28-29, lines 552-567
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Other

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43	Conflicts of interest - Potential sources of influence or perceived influence on	Page 29, lines 586-587
44	study conduct and conclusions; how these were managed	
45		
46	Funding - Sources of funding and other support; role of funders in data collection,	Pages 29-30, lines 586-593
47	interpretation, and reporting	
48		

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

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**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388

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