



HEALTH SYSTEM RECOVERY AFTER EPIDEMICS

WHAT INFLUENCES HEALTH SERVICE RECOVERY AFTER EPIDEMICS?



Post-Ebola Measles outbreaks may have been preempted by **provision of infection and prevention control trainings and supplies** for health workers to sustain routine vaccination¹



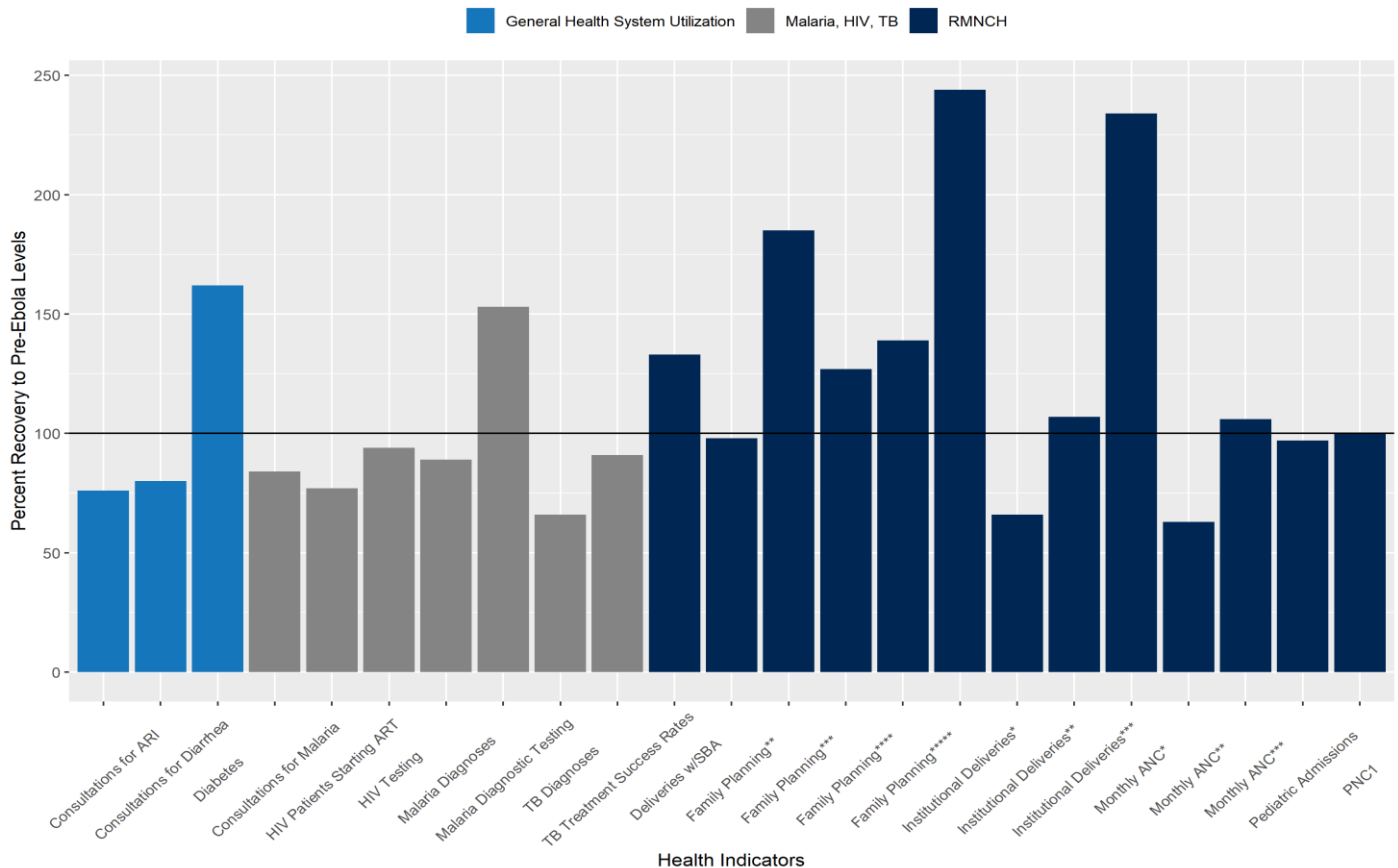
Distrust in government and exposure to government-organized community outreach strongly predict negative and positive health service usage respectively in the post-Ebola period²



Fear of infection and mistrust of health facility staff hinder the recovery of antenatal and obstetric services. Community engagement models such as **participatory action research** may stimulate recovery of health service utilization by **improving community and health worker relations**³

1. [Sesay 2017](#) 2. [Morse 2016](#) 3. [Jones 2018](#)

Health System Recovery to Pre-Ebola Levels by Indicator



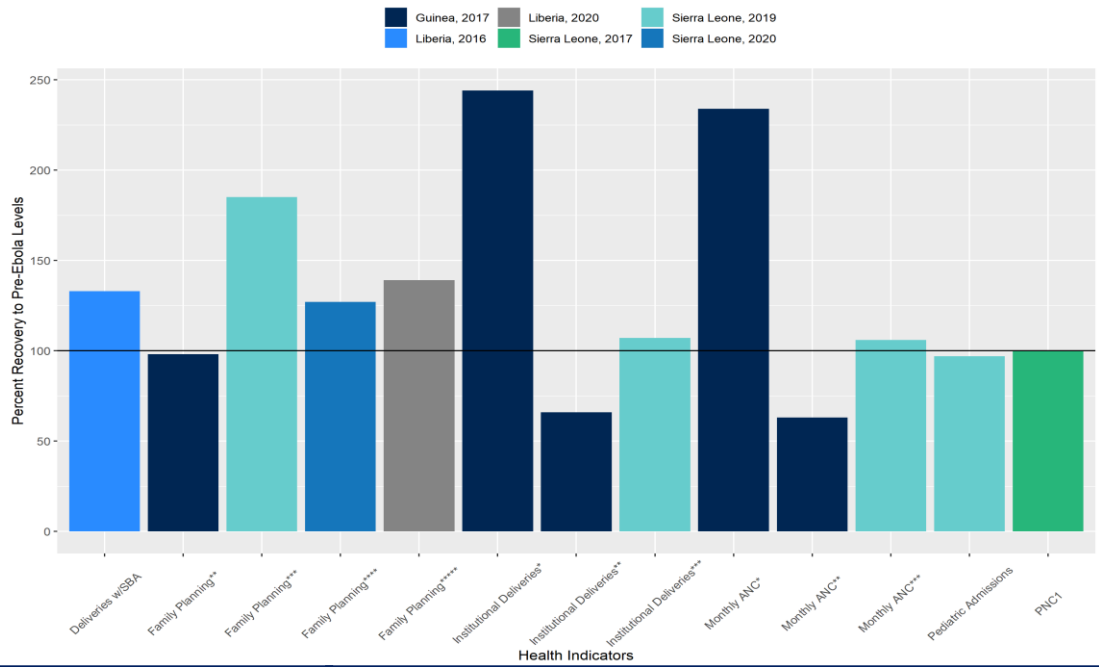
The post-Ebola time period was defined separately for individual studies, each of which is listed in the individual Recovery by Service Area appendix pages below. Multiple studies collected data on the same RMNCH indicators, with each study setting being differentiated on the x-axis by asterisks * = Guinea, 2017; ** = Guinea (Macenta Only), 2017; *** = Sierra Leone, 2019; **** = Sierra Leone, 2020; ***** = Liberia, 2020.

RECOVERY BY SERVICE AREA

TIMELINE

- West African Ebola Outbreak officially declared **March 2014**
- Liberia first declared Ebola-free, **May 2015** (final declaration, June 2016)
- Sierra Leone first declared Ebola-free, **November 2015** (final declaration, March 2016)
- Guinea first declared Ebola-free, **December 2015** (final declaration, June 2016)

RMNCH Recovery to Pre-Ebola Levels by Indicator



RMNCH: PREVENTIVE

ANTENATAL CARE

Study	Country & Year	Key Finding
Delamou 2017	Guinea, 2017	ANC1 went from an average pre-Ebola monthly increase of 109 to an Ebola monthly decrease of 418, to a post-epidemic (March, 2015, to Feb, 2016) monthly increase of 257.
Camara 2017	Macenta District, Guinea, 2017	Monthly ANC visits declined 41% during Ebola (1 March 2014 to 28 February 2015) but recovered to only 63% of pre-Ebola levels in the post-Ebola period (1 March to 31 July 2016).
Caulker 2017	Sierra Leone, 2017	No significant change in maternal/neonatal PNC1 before/during/after Ebola.
Quaglio 2019	Sierra Leone, 2019	Community-level trends for pre-versus post-Ebola (March 2015 to December 2017) are significant for ANC1 (-6%) and ANC4 (-8%).

FAMILY PLANNING

Camara 2017	Macenta District, Guinea, 2017	Utilization of FP dropped by 51% during Ebola outbreak but recovered to 98% of pre-Ebola levels.
Bietsch 2020	Sierra Leone, 2019	Average monthly FP distribution dropped 23% during Ebola, recovered to 27% over pre-Ebola levels.
Bietsch 2020	Liberia, 2019	Average monthly FP distribution dropped 65% during Ebola, recovered to 39% over pre-Ebola levels.

RMNCH: CURATIVE

DELIVERIES

Study	Country & Year	Key Finding
Delamou 2017	Guinea, 2017	Institutional Deliveries went from an average monthly increase of 61 pre-epidemic (January, 2013, to February, 2014), to a decrease of 241 per month during the outbreak (March, 2014, to February, 2015), and an increase of 149 per month post-Ebola (March, 2015, to Feb, 2016).
Camara 2017	Macenta District, Guinea, 2017	Monthly average of institutional deliveries declined during Ebola (1 March 2014 to 28 February 2015) and in the post-Ebola period (1 March to 31 July 2016) recovered to 66% of pre-Ebola levels (1 March 2013 to 28 February 2014).
Quaglio 2019	Sierra Leone, 2019	Community-level trends for pre-Ebola (January 2012 to May 2014) versus post-Ebola (March 2015 to December 2017) are significant for institutional deliveries (-7%).
McBain 2016	Liberia, 2016	33% increase in deliveries by skilled birth attendants (February 2016) compared to 17 preceding months, including Ebola and the 9-month gestational period following Ebola.

ADMISSIONS

Quaglio 2019	Sierra Leone, 2019	Hospital-level trends for pre-Ebola (January 2012 to May 2014) versus post-Ebola (March 2015 to December 2017) are significant only for pediatric admissions (3%).
------------------------------	--------------------	--

VACCINE-PREVENTABLE ILLNESS: PREVENTIVE

VACCINE STOCK OUTS

Study	Country & Year	Key Finding
Camara 2017	Macenta District, Guinea, 2017	Post-Ebola (1 March to 31 July 2016), there was a 65-fold reduction in stock-outs compared to pre-Ebola (1 March 2013 to 28 February 2014).
Camara 2017	Macenta District, Guinea, 2017	Post-Ebola, overall vaccine administration did not recover to pre-Ebola levels, with the highest gaps seen in polio and pentavalent vaccines, which had shortages of respectively 40% and 38%.

COVERAGE AND DROP-OUTS

Clarke 2019	Liberia, 2019	Immunization services rebounded strongly from the 2014-2015 EVD outbreak. From 2014-2017 there was a 36% increase in national coverage for Penta 3. From 2015-2017 MCV1 coverage improved by 23% from 64% to 87%, and the Number of AFP cases receiving 3 or more doses of OPV increased from 36% to 61%.
-----------------------------	---------------	---

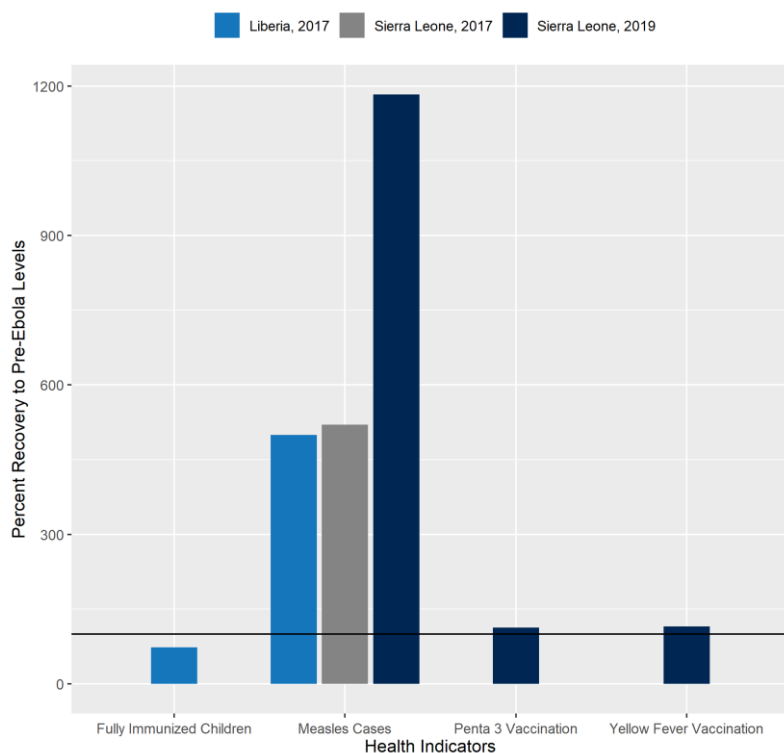
PEDIATRIC IMMUNIZATIONS

Wesseh 2017	Liberia, 2017	Recovery rate for proportion of fully immunized children in the post-Ebola period (July–December 2015) was respectively 82%, 21% and 9% in the most, moderately and least affected counties (73% overall). Outreach recovered more slowly than facility-based immunizations.
-----------------------------	---------------	--

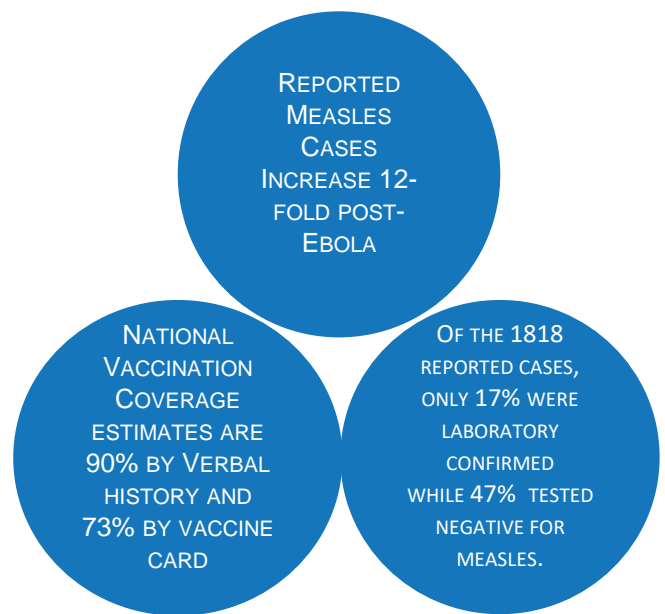
MEASLES

Study	Country & Year	Key Finding
Wesseh 2017	Liberia, 2017	The mean number of measles cases reported per month was 12 pre-Ebola, 16 Ebola and 60 in the post-Ebola period (July–December 2015).
Sesay 2017	Sierra Leone, 2017	80% increase in cases during Ebola, multiplied 6.5-fold post-Ebola (1 November 2015–30 April 2016). Infection prevention and control (IPC) training as well as the provision of IPC supplies for health workers should have been addressed pre-emptively. This would have boosted health worker confidence and motivation to sustain routine vaccination.
Sesay 2019	Sierra Leone, 2019	There were a total of 525 measles cases pre-Ebola, 962 cases during Ebola and 6245 cases post-Ebola (June 1, 2016–April 30, 2017). Average number of measles cases increased from 48/month in the pre-Ebola period to 568/month (12-fold increase) post-Ebola.
Takahashi 2015	West Africa, 2015	If vaccination had continued at pre-Ebola rates, a generalized measles outbreak would have caused 126,868 (plausible range: 84,833–181,769) cases. However, the projected outbreak size increases to 227,484 (153,458–321,702) cases after 18 months of disruptions, resulting in a projected 5,209 (1,757–16,173) additional deaths from measles. Model assumed 75% reduction in routine vaccination.

Vaccine-Preventable Illness Recovery to Pre-Ebola Levels by Indicator



SIERRA LEONE AND MEASLES



MALARIA, HIV, TB: PREVENTIVE

MALARIA, HIV, TB: CURATIVE

MALARIA TESTING AND DIAGNOSIS

MALARIA

Study	Country & Year	Key Finding
Dunbar 2017	Liberia, 2017	Diagnosed malaria caseloads decreased by 47% during the Ebola outbreak and by 11% after, compared to the pre-Ebola period. Linear regression of monthly proportions of confirmed malaria cases-as a proxy indicator of program performance-over the pre- and post-Ebola periods indicated that the malaria program could require 26 months after the end of the acute phase of the Ebola outbreak to recover to pre-Ebola levels. Clear guidance on when to abandon the emergency measures after an outbreak may be needed to ensure faster recovery of malaria program performance.
Sesay 2019	Sierra Leone, 2019	Following investments in staff and community involvement, utilization of malaria diagnostic testing to confirm malaria cases rose steeply from 32,219 pre-Ebola to 49,186 post-Ebola (June 1, 2016-April 30, 2017).
Sesay 2017	Sierra Leone, 2017	Monthly malaria consultations declined to 27% of pre-Ebola levels during the outbreak and only recovered to 16% lower than pre-Ebola levels during the post-Ebola period (1 November 2015–30 April 2016).

Study	Country & Year	Key Finding
Wagenaa r 2018	Liberia, 2018	ACT treatment for malaria was the only indicator with an estimated net increase in system outputs through December 2016, showing an excess of +78,583 outputs (95% CI: -309,417, +450,661, p = 0.634) compared to pre-EVD forecasted trends, although this increase was not statistically significant.

TUBERCULOSIS

Konwloh 2017	Liberia, 2017	Treatment success rates among TB patients were: 80% pre-Ebola, 69% Ebola (P < 0.001) and 73% post-Ebola (P < 0.001) (July-December 2015).
------------------------------	---------------	---

HIV

Konwloh 2017	Liberia, 2017	The proportions of patients found to be HIV-positive and started on antiretroviral therapy decreased as follows: pre-Ebola (respectively 15% and 34%), Ebola (14% and 30%) and post-Ebola (12% and 26%) (July-December 2015).
------------------------------	---------------	---

MALARIA STOCK OUTS

Sesay 2019	Liberia, 2017	The recovering health system was unable to cope with the increased demand for anti-malaria drugs, which resulted in stock outs during the post-Ebola period (June 1, 2016-April 30, 2017).
----------------------------	---------------	--

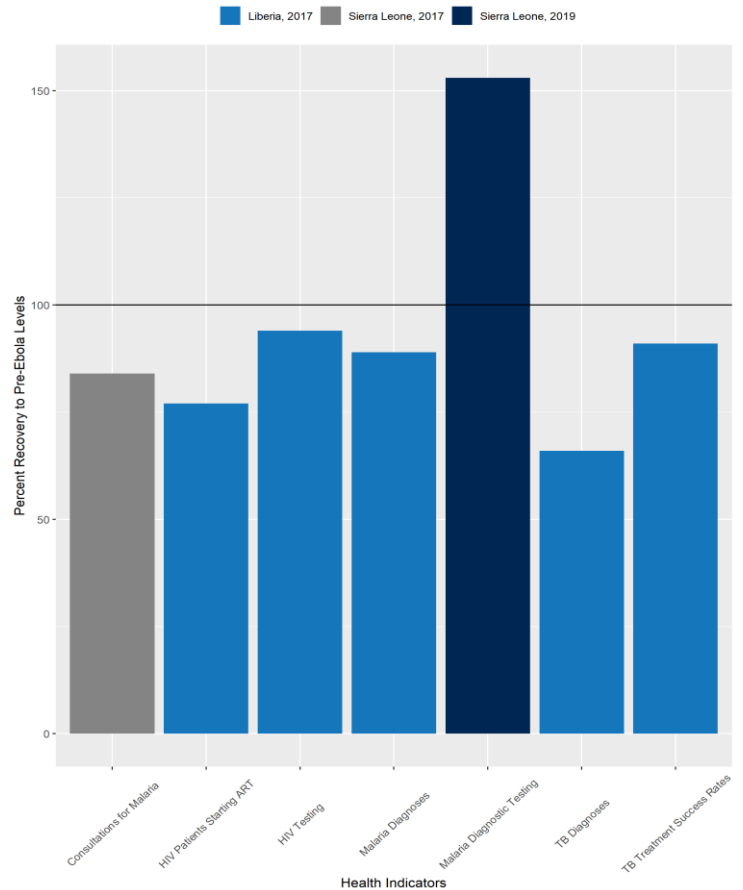
HIV

Konwloh 2017	Liberia, 2017	The proportions of patients tested for HIV decreased as follows: pre-Ebola (72%), Ebola (69%) and post-Ebola (68%) (July-December 2015).
------------------------------	---------------	--

TUBERCULOSIS

Konwloh 2017	Liberia, 2017	Significant decreases in numbers of cases with smear-positive pulmonary TB (PTB) from the pre-Ebola period (n = 855), to the Ebola (n = 640, P < 0.001) and post-Ebola (n = 568, P < 0.001) periods (July-December 2015).
------------------------------	---------------	---

Malaria, HIV, and TB Service Recovery to Pre-Ebola Levels by Indicator



GENERAL HEALTH SYSTEM UTILIZATION

OUTPATIENT VISITS			OTHER DISEASES		
Study	Country & Year	Key Finding	Study	Country & Year	Key Finding
Wagenaar 2018	Liberia, 2018:	All indicators had significant positive trends during the post-EVD period, with every system output exceeding pre-Ebola forecasted trends for 3 consecutive months by November 2016. Prior to exceeding pre-EVD forecasted trends for 3 months, we estimate statistically significant cumulative losses of -776,110 clinic visits (95% CI: -1,480,896, -101,357, p = 0.030).	Sesay 2017	Sierra Leone, 2017	Consultations for ARI and watery diarrhea declined during EVD. The declines during the Ebola period were 27% for ARI and 38% for watery diarrhea. In the post-Ebola period (1 November 2015–30 April 2016), the consultations remained respectively 24% (ARI) and 20% (watery diarrhea) lower than pre-Ebola levels.
USAGE OF HEALTH SERVICES			MEDICAL STAFF DEFICITS		
Morse 2016	Liberia, 2016	Panel survey evidence indicates that usage of health services for children and adults increased by 77% and 104%, respectively, between the late-crisis period (December 2014) and the post-crisis periods (March 2015 and June 2015). In the late-crisis period, (1) socioeconomic factors weakly predict usage, (2) distrust in government strongly predicts negative usage, (3) direct exposure to the EVD outbreak, as measured by witnessing dead bodies or knowing Ebola victims, negatively predicts trust and usage and (4) exposure to government-organized community outreach predicts higher trust and usage.	Koroma 2019	Western Area District, Sierra Leone, 2019	Key findings were: i) a decrease followed by an increase in NCDs in the Ebola (June–December 2014) and post-Ebola periods (June–December 2015) with numbers not reaching pre-Ebola levels and this distribution was mirrored for HTN; ii) An increase in Diabetes Mellitus from 282 cases pre-Ebola to 457 in the post-Ebola period; iii) a decrease in CVD and tumors/cancer in the Ebola outbreak period which continued to decline or stay unchanged in the post-Ebola period.
			Decroo 2019	Sierra Leone, 2019	Although service utilization has increased, staff shortages remain unaddressed. Medical staff and non-medical staff deficits hover around 60% and 90%, respectively, and did not substantially change post-Ebola (June 1, 2016–April 30, 2017).

General Health System Utilization Recovery to Pre-Ebola Levels by Indicator

