

Case fatality during cholera outbreaks in Democratic Republic of the Congo (DRC) higher in adults and in non-hotspot zone

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Cholera in DRC

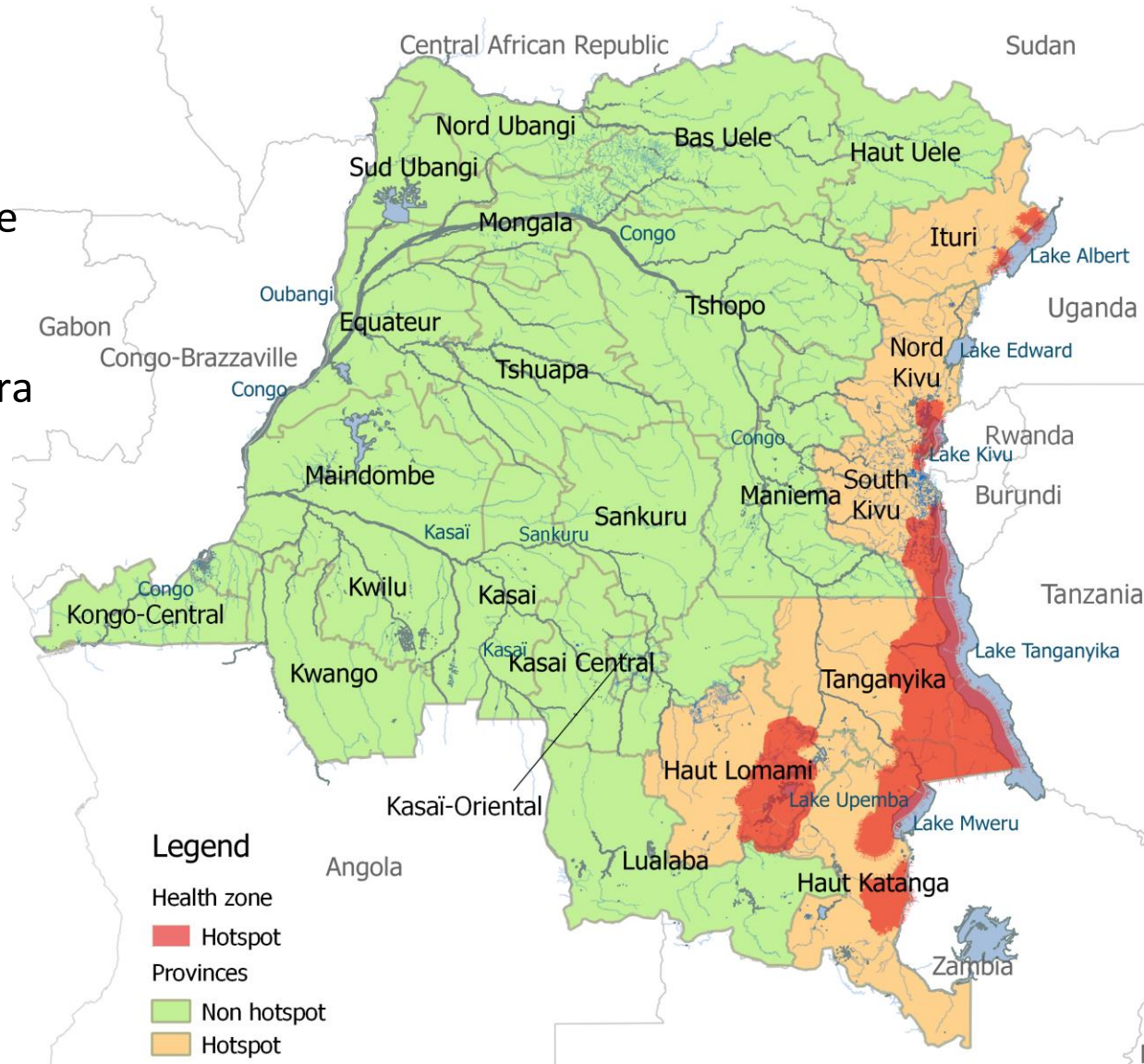
1973: Imported cholera cases first reported

Since 1978: endemic around the Great Lakes (Eastern DRC)

2017: WHO Roadmap for cholera elimination: Target cholera 'hotspots'

26 of 518 health zones (HZ) in 6 out of 26 provinces identified as cholera 'hotspots'

- Population: 5 million
- Estimated 189,000 cases/year

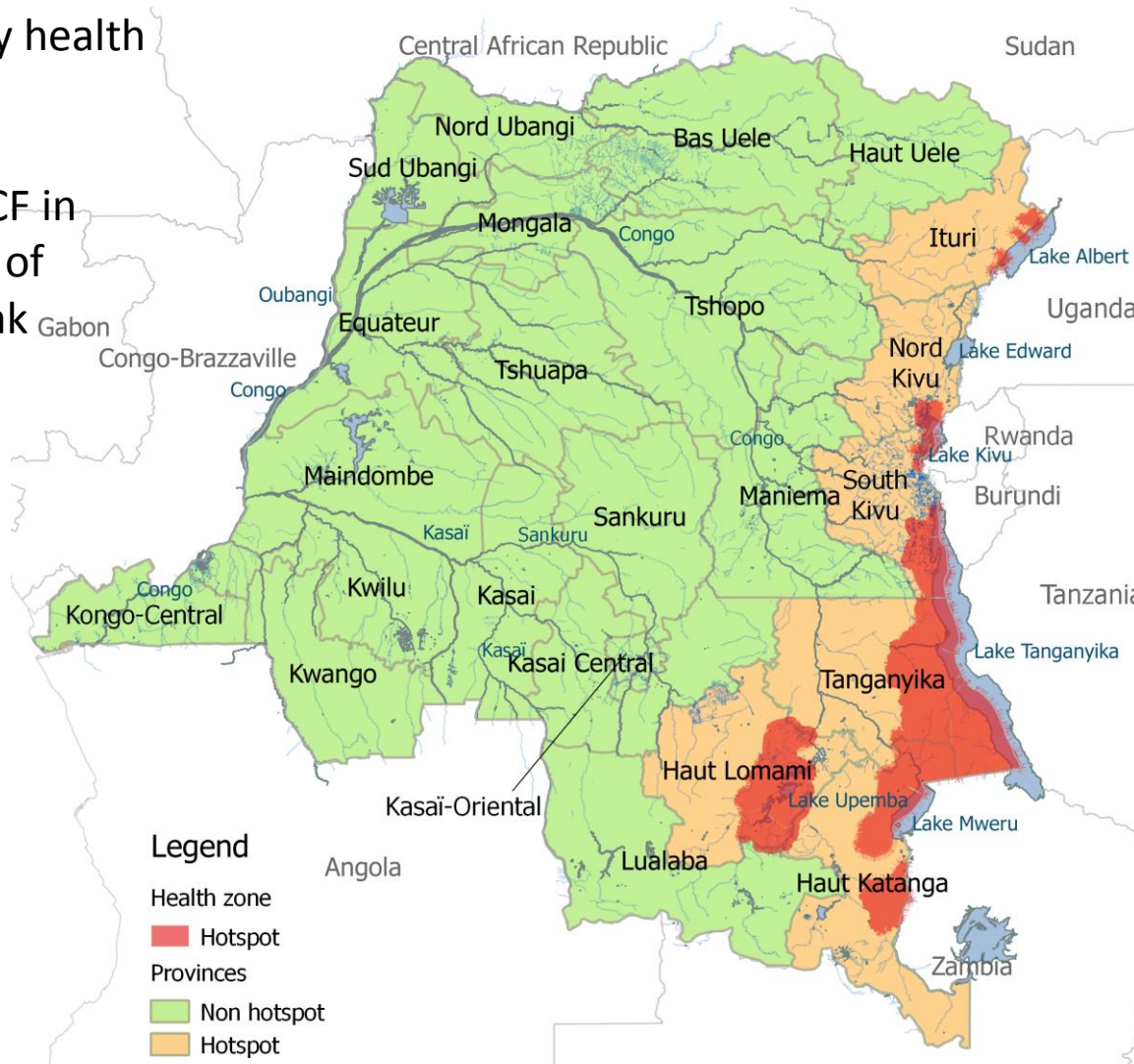


Methods - data collection

	Ministry of Health	National cholera reference laboratory (INRB)	Médecins sans Frontières (MSF)
Data source	Weekly syndromic surveillance data; Aggregated by health zone	Laboratory confirmation testing of samples from suspected cases	Patient linelist data from cholera treatment centres (CTC)
Type of reported data	Weekly number of suspected cases and deaths	Individual confirmed case patient characteristics, serotypes and antibiograms	Individual patient characteristics, treatment and outcome
Study period	2008-2017	2008-2017	18 interventions, 2015-2017
Study site	All DRC health zones		Non hotspot health zones in non-hotspot provinces (along Congo River) and in hotspot provinces
Case definition	(i) during an outbreak: acute watery diarrhea with or without vomiting in a patient ≥ 1 year old (ii) in non-outbreak situations: severe dehydration or death following acute watery diarrhea in a patient ≥ 5 years old		>3 liquid stools in the last 24 hours

Methods – data analysis

- Description transmission of outbreaks in time, place, person
- Annual cumulative attack rates by health zone
- Univariable analysis to compare CF in provinces, age groups and weeks of admission throughout an outbreak
- Comparison between
 1. hotspot health zones
 2. non-hotspot health zones in
 - hotspot provinces
 - non-hotspot provinces

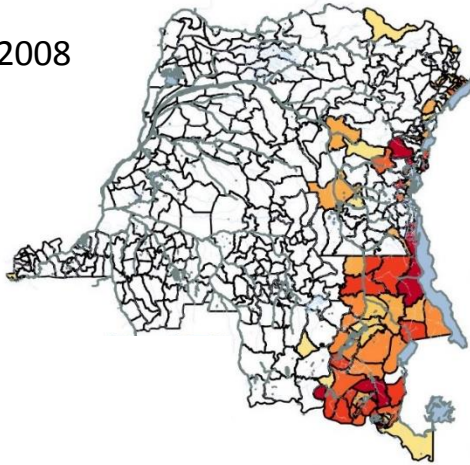


Geographical spread of cholera in DRC, 2008 – 2017

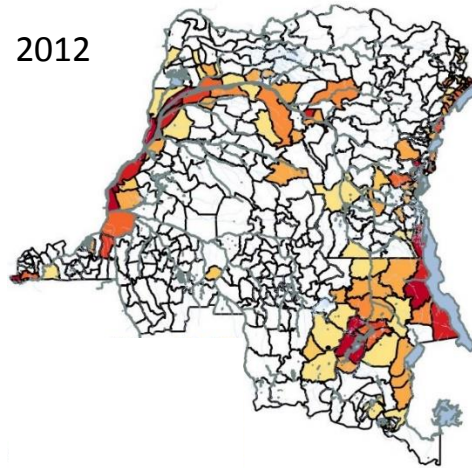
Stable incidence in the East with two large recurring multi-year outbreaks along the Congo river.

- Dynamic 1: **establishment** of endemic areas around the Great Lakes (hotspots)
- Dynamic 2: **recurring outbreaks** in areas around the Congo river
- Dynamic 3: outbreaks occurring in the **interior of the country**

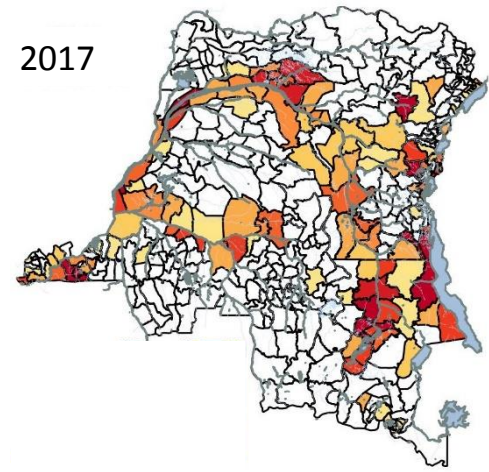
2008



2012



2017



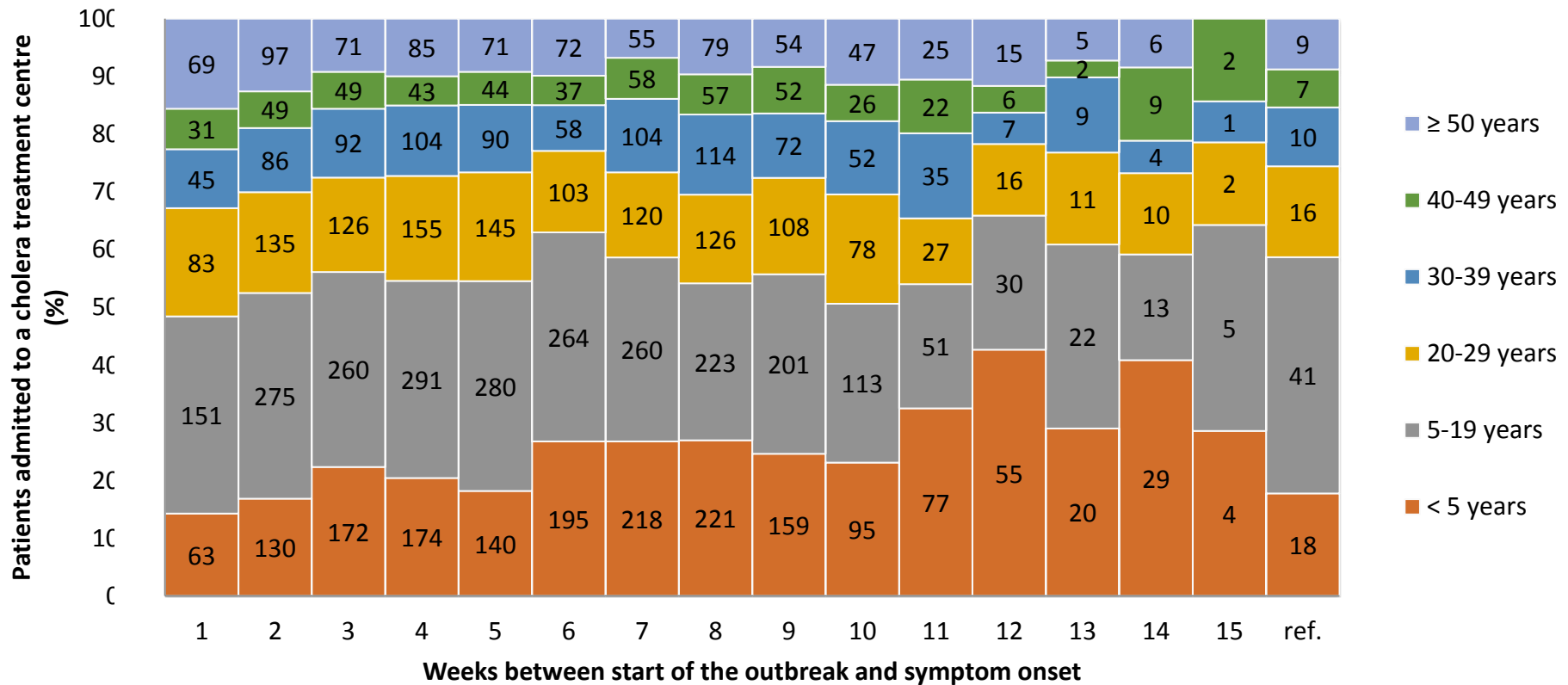
Lower case fatality in cholera hotspots

	Hotspot status	Deaths	Cases	Case fatality (%)	Relative risk (95% CI)
Suspected cholera surveillance	Hotspot health zones	1,407	127,642	1.1	ref.
	Non-hotspot health zones in hotspot provinces	1,745	96,570	1.8	1.6 (1.5-1.8)
	Non-hotspot provinces	2,079	46,640	4.5	2.9 (2.7-3.1)
Patients in CTCs CTC admissions	Non-hotspot health zones in hotspot provinces	3	1,294	0.2	ref.
	Non-hotspot provinces	264	7,782	3.4	14.6 (5.0-71.4)

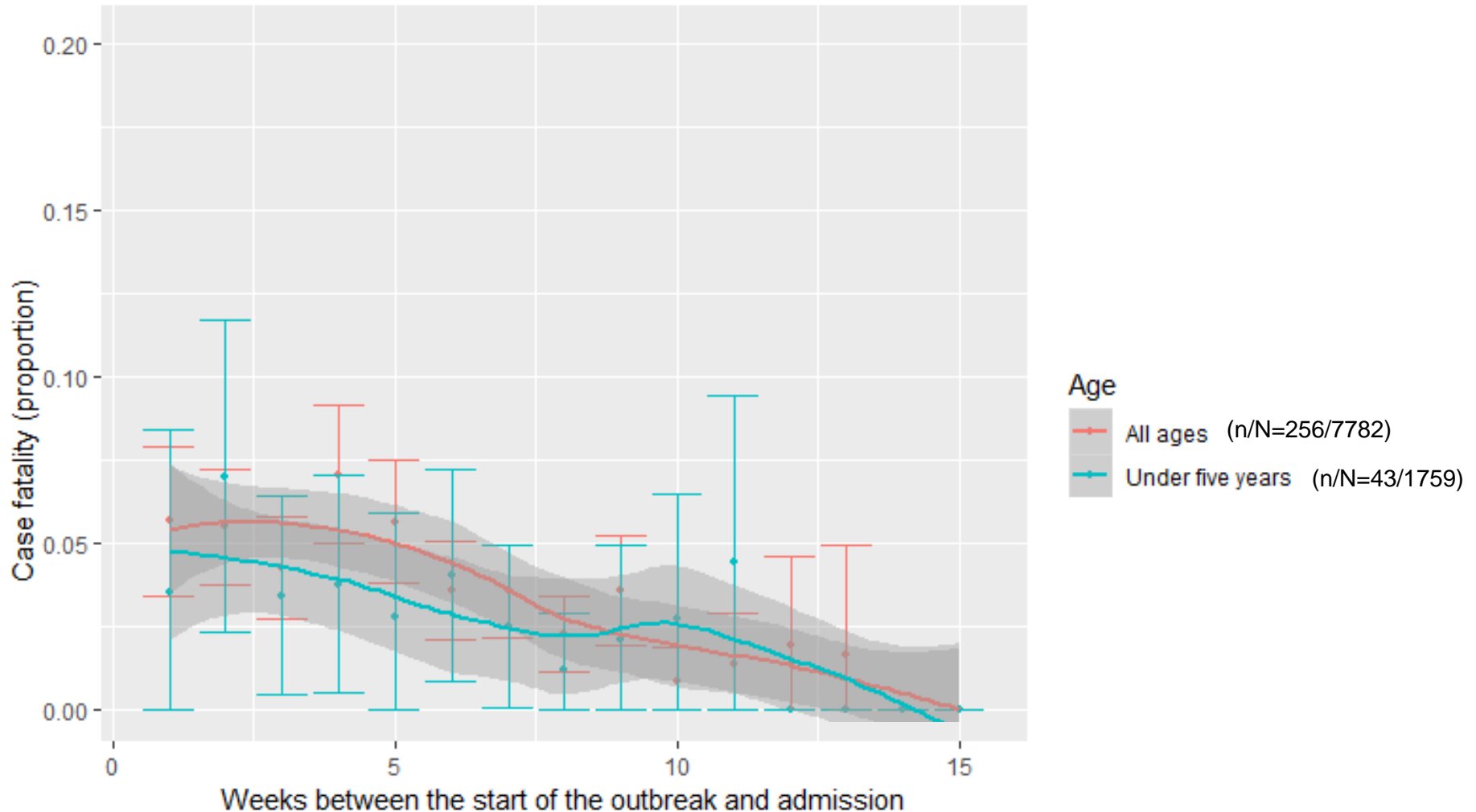
Higher case fatality associated with increasing age

Data	Hotspot status	Age	Deaths	Cases	Case fatality		Relative risk
			n	n	%	%	(95% CI)
Suspected cholera surveillance	Hotspot health zones	< 5 years	292	33,477	26	0.9	ref
		≥ 5 years	1,116	94,082	74	1.2	1.4 (1.2-1.6)
	Non-hotspot health zones in hotspot provinces	< 5 years	301	23,615	24	1.3	ref
		> 5 years	1,440	72,777	75	2.0	1.6 (1.4-1.8)
	Non-hotspot provinces	< 5 years	318	8,916	19	3.6	ref
		≥ 5 years	1,775	37,624	81	4.7	1.3 (1.2-1.5)
Cholera treatment centre admissions	Non-hotspot health zones in hotspot provinces	< 5 years	0	357	28	0.0	ref
		5 - 19 years	1	625	48	0.2	
		20 - 49 years	1	241	19	0.4	4.1 (0.1-320)
		≥ 50 years	1	63	5	1.6	15.6 (0.2-1223)
	Non-hotspot provinces	< 5 years	43	1,759	23	2.4	ref
		5 - 19 years	68	2,442	31	2.8	1.1 (0.77-1.71)
		20 - 49 years	104	2,609	34	4.0	1.6 (1.1-2.4)
		≥ 50 years	32	752	10	4.3	1.7 (1.1-2.8)

Age distribution weekly evolution during an outbreak



Case fatality among CTC patients throughout an outbreak, non-hotspot health zones, DRC, 2015-17



Limitations

- (Syndromic) suspected cholera surveillance
 - Could have lower specificity in non-hotspot areas, where health care workers experience less cholera -> potential overestimation of cases -> underestimated case fatality
 - Likely to be not exhaustive: underestimation of cases and of cholera-related deaths
 - Areas with OCV vaccination campaigns included (Kinshasa in 2016 and Kalémie in 2015), but the scale was very small and no difference in results when excluding these areas
- CTC admissions: CTC may receive more late presenters (distance to travel), more at risk of dying
- We assumed health zones were stable throughout the study period

Conclusions

- Context of conflict and instability in some hotspots
 - > continued transmission
 - > recurrent outbreaks in non-hotspot **vulnerable** health zones
 - While more than half of cholera cases are reported in cholera hotspots, three quarters of deaths are reported outside the hotspots
 - Most deaths reported during first weeks of an outbreak
 - possibly reflects
 - lower levels of natural immunity
 - limited access to treatment and water and sanitation services
- > control efforts should be rolled out within weeks after outbreak starts

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Recurrent Cholera Outbreaks, Democratic Republic of the Congo, 2008–2017

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