

13th Annual Louisiana Water Conference

Louisiana State University
Baton Rouge, Louisiana

15 & 16 April 2019

LAWATER 2019

**SAFE WATER for DISINFECTION:
USING DISINFECTANT WATER**

for the

2014 EBOLA OUTBREAK

in

Sierra Leone

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16 April 2019

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ACKNOWLEDGEMENT: CO-AUTHORS

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CHRONOLGY

2010 HAITI – Earthquake > Human Waste
Focus - Decontamination

2014 WEST AFRICA – Outbreak > Ebola Virus
Focus - Disinfection

HAITI – Truitier Pit (2010)





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Google earth

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CHRONOLGY

2015 WHO DECLARATION:

West Africa – Outbreak > Ebola Virus

Guinea / Liberia / Sierra Leone

EBOLA OUTBREAK

Overview – West Africa (WHO 2015)

▶ Sierra Leone	Cases	14,124
	Deaths	3,956
▶ Liberia	Cases	10,675
	Deaths	4,809
▶ Guinea	Cases	3,811
	Deaths	2,543

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CHRONOLGY

2015 WHO DECLARATION:

Prevent Transfer > *Ebola Virus*

Inhibit Contact > *Body Fluids*

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EBOLA ODYSSEY

2015 WHO DECLARATION:

Prevent Transfer > Disinfect

Inhibit Contact > Decontaminate

(Incineration and Dispose)

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EBOLA ODYSSEY

WHO - CHLORINE SOLUTIONS:

0.50% Weight / Sodium Hypochlorite

0.05% Weight / Sodium Hypochlorite

Q: WATER ?

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EBOLA ODYSSEY

USE - CHLORINE SOLUTIONS:

0.50 % > Treatment

0.05 % > Hygiene

0.50 % > Facility

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EBOLA ODYSSEY

WHO - CHLORINE SOLUTIONS:

Q: Sources of NaClO₄ ?

Q: Sources of Safe Water ?

Water \sum Raw - Clean -- Safe --- Medical

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EBOLA ODYSSEY

WHO - CHLORINE SOLUTIONS:

A: Sources of Clean Water?

Bore Holes and Traders

Q: Sources of NaClO₄ ?

World Market

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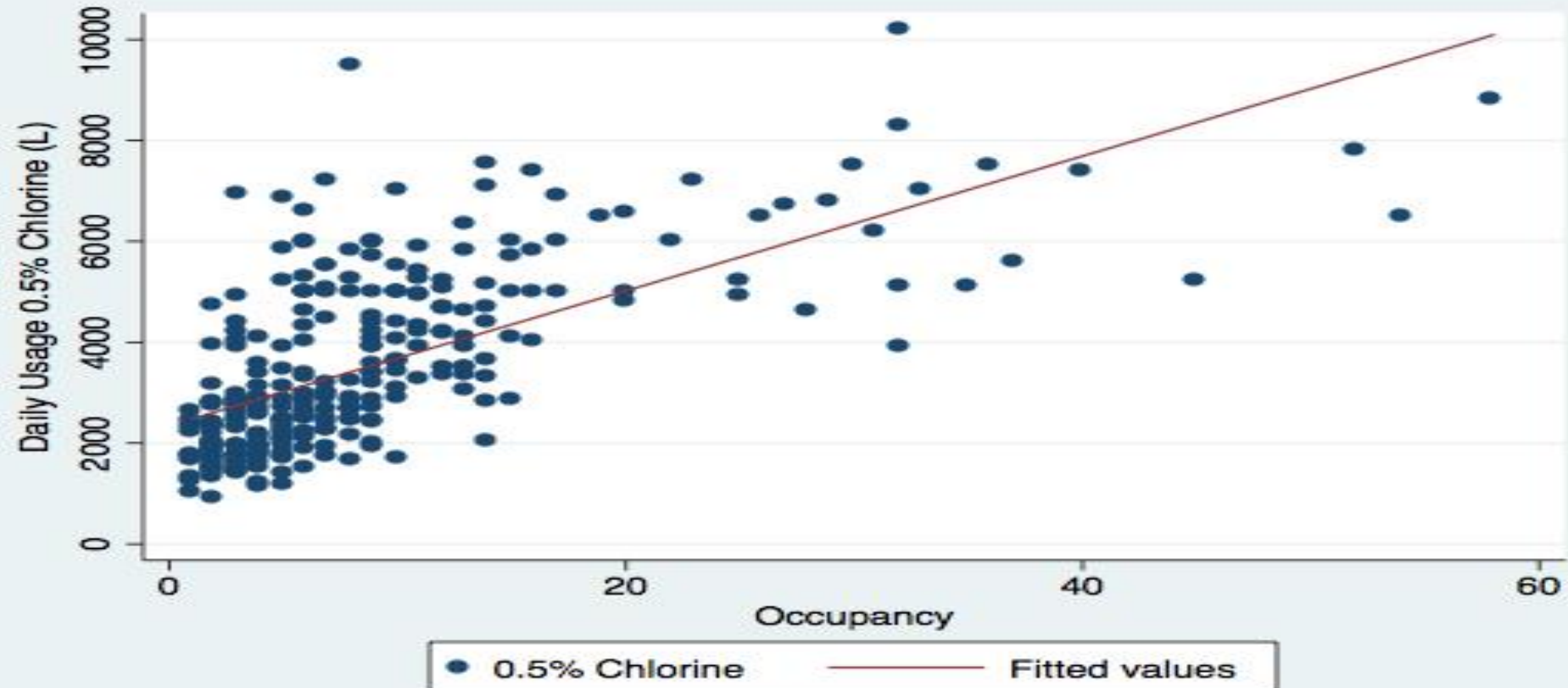
EBOLA OUTBREAK

Sierra Leone

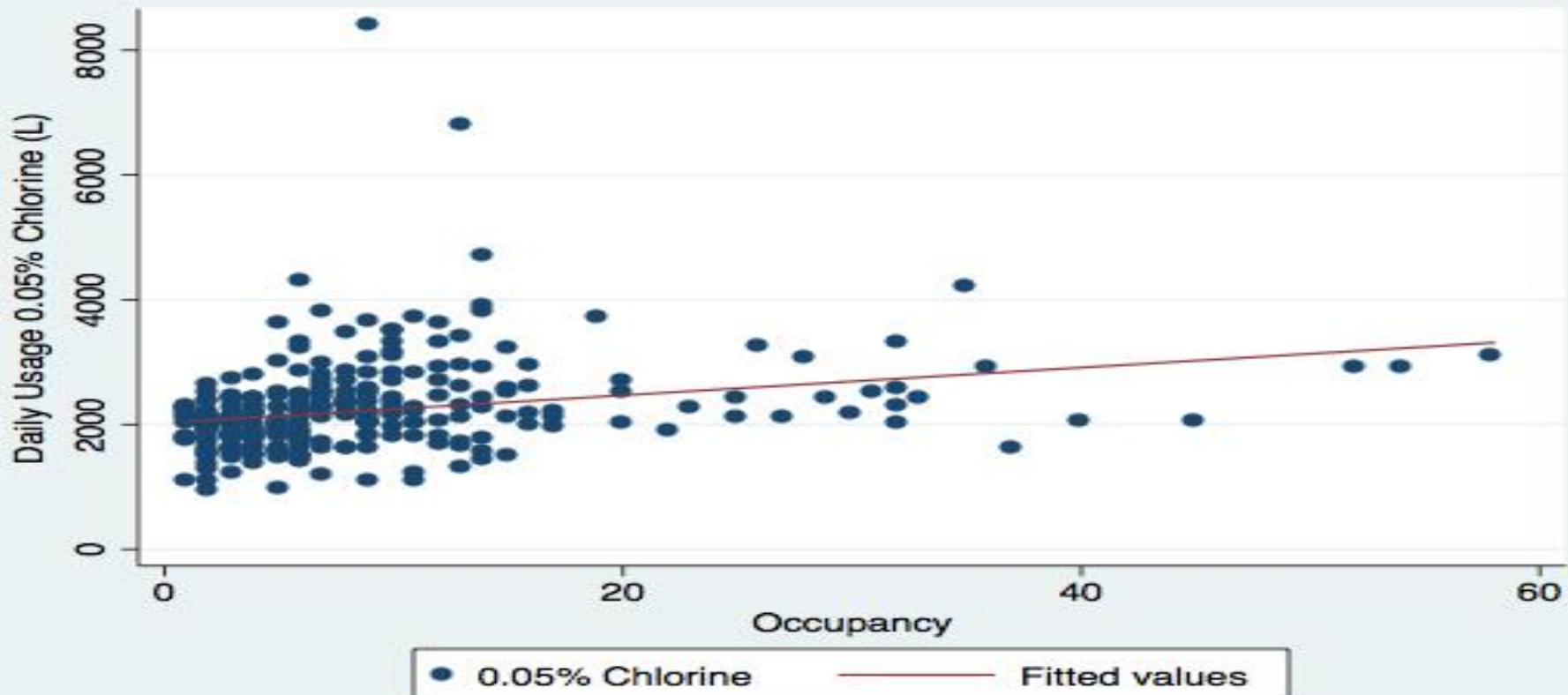
WHO: World Health Organization (2016)

▶ Sierra Leone	Cases	14,124
	Deaths	3,956
▶ Global	Cases	28,646
	Deaths	13,323

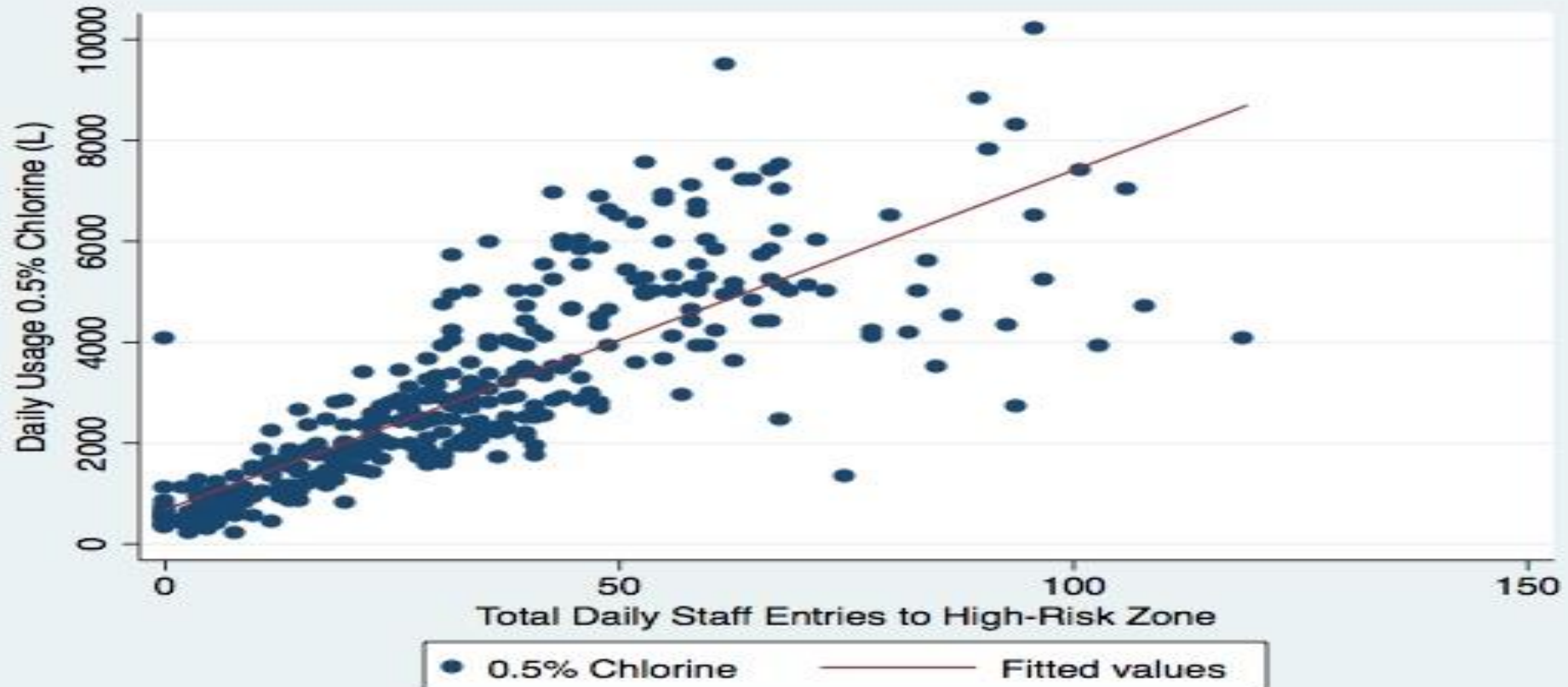
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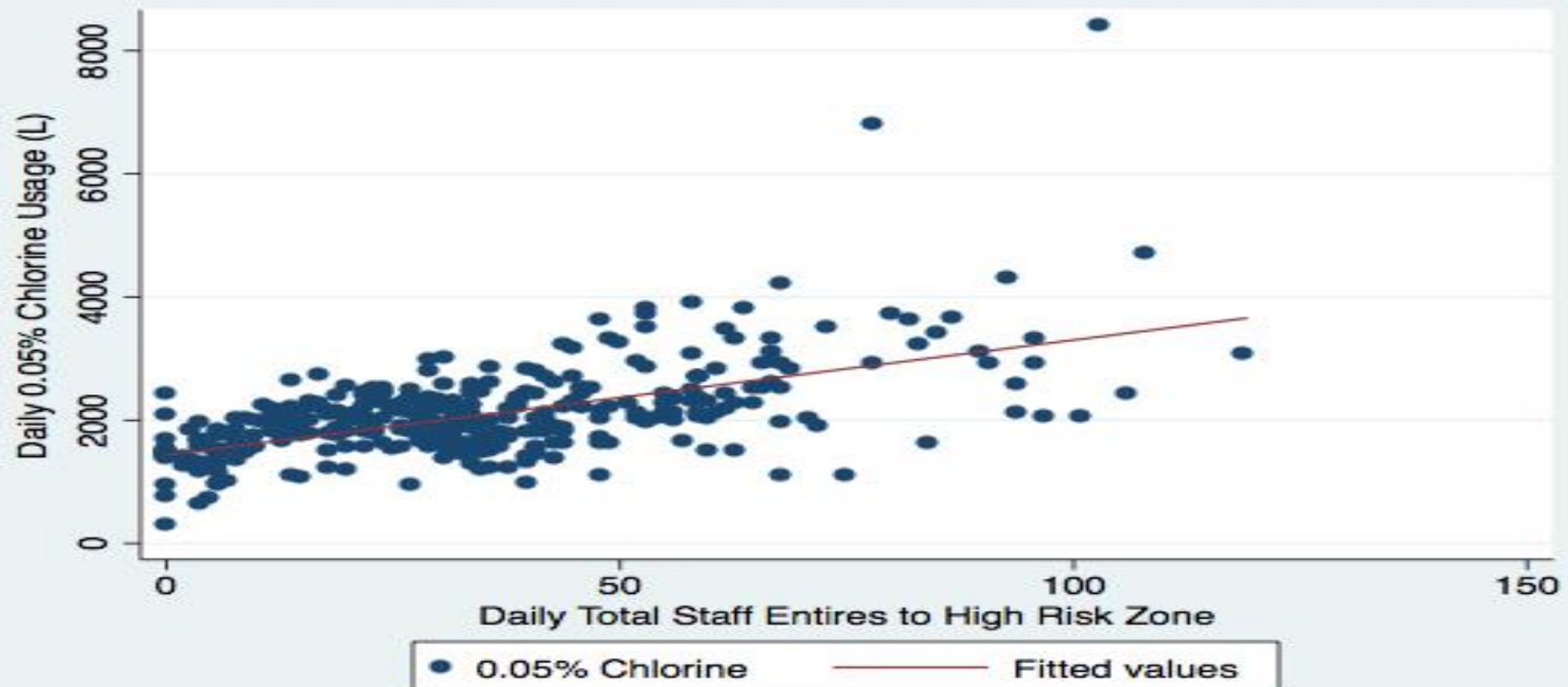
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Table 1: Key variables in ETU, Sierra Leone

Key Variables (per day)	Median (IQR)
Patient Occupancy	6 (3-11)
Chlorine Consumption	
Low Concentration (0.05% cl, Liters)	2000 (1600-2340)
High Concentration (0.5% cl, Liters)	2490 (1520-4200)
High Risk Zone Staff Entries	
Medical	14 (7-20)
WASH	16 (8-29)
Total	31 (15.5-47.5)
WASH Activities	
Incinerated Bags (HRZ)	14 (7-22)
Incinerated Bags (LRZ)	20 (17-24)
Disinfected Cubical Beds	4 (2-12)

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Table 3: PPE usage per day in ETUs, Sierra Leone

Item	Median (IQR)
Disinfected	
Goggles	37 (19-50)
Latrines	3 (3-4)
Wards	3 (2-3)
Laundered	
Scrubs	126 (108-162)
Aprons	59 (43-72)
Heavy Duty Gloves	52 (39-64)
Boots	200 (170-233)
Used	
Coveralls	19 (7.5-30.5)
N95 Masks	20 (8-31)
Hoods	20 (9-31)
Damaged/Repaired	
Total PPE Damaged	1 (0-4)
Sprayers Repaired	2 (2-3)

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Table 2: Multivariate linear regression analysis of key WASH/IPC variables

					High Risk Staff Zone Entries				
					Occupancy				
					95 % CI				
		Coefficient	Lower	Upper	p	Coefficient	Lower	Upper	p
Chlorine Consumption									
	0.05% cl solution	22.19	12.75	31.63	<0.01	18.67	16.02	21.32	<0.01
	0.5% cl solution	133.45	116.06	150.84	<0.01	67.30	62.34	72.27	<0.01
WASH Activities									
	Bags Incinerated	0.42	0.24	0.60	<0.01	-	-	-	-
	Beds Disinfected	0.91	0.82	1.00	<0.01	-	-	-	-
PPE									
	Disinfected								
	Goggles	-	-	-	-	1.26	1.15	1.37	<0.01
	Laundered								
	Scrubs	-	-	-	-	1.92	1.63	2.21	<0.01
	Aprons	-	-	-	-	1.07	0.93	1.21	<0.01
	Heavy Duty Gloves	-	-	-	-	0.95	0.83	1.08	<0.01
	Boots	-	-	-	-	1.58	1.14	2.01	<0.01
	Used								
	Coveralls	-	-	-	-	0.86	0.79	0.93	<0.01

SIERRA LEONE – Ebola Outbreak



SIERRA LEONE – Ebola Outbreak



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MERCI BEAUCOUP



Questions ?

MAKENI – Ebola Treatment Center

