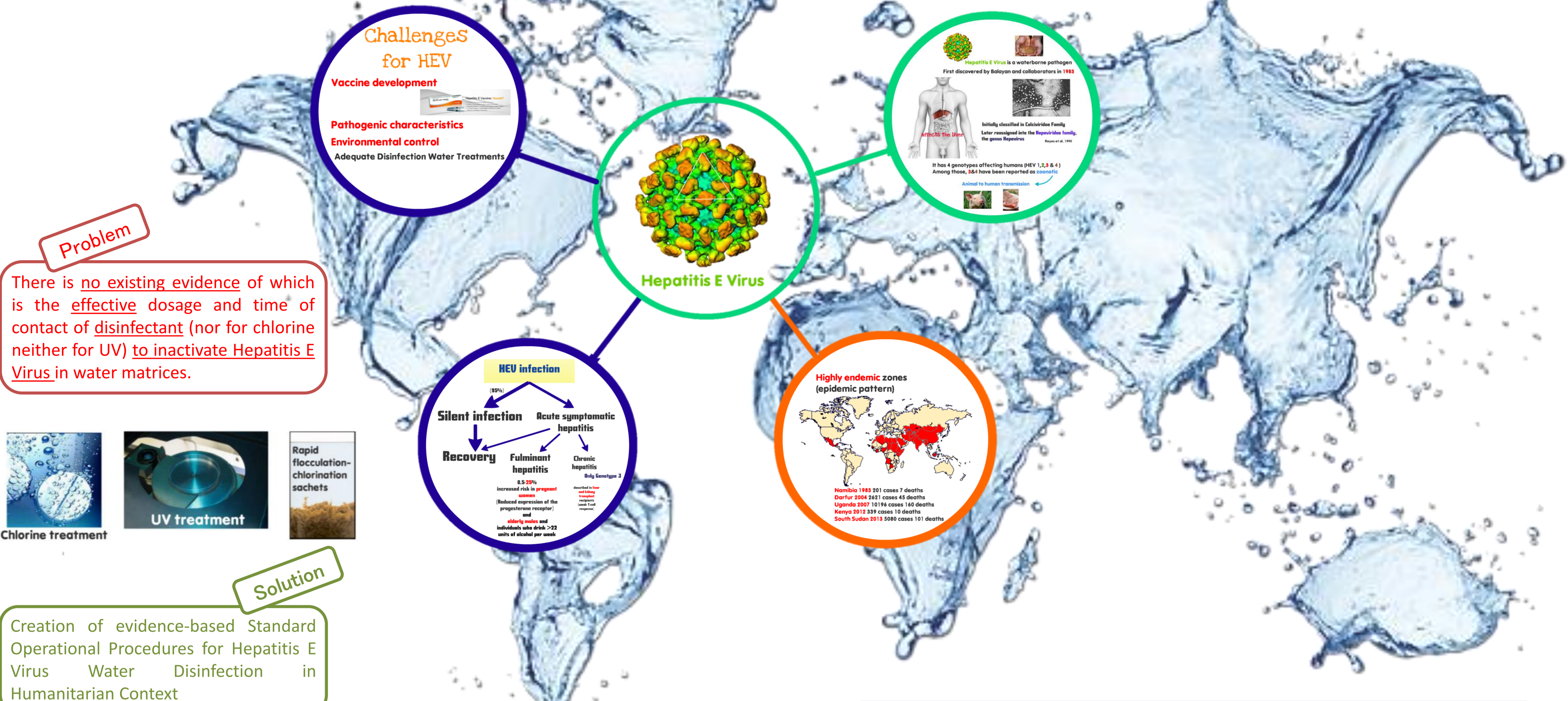


# WADHE project

## Water Disinfection Protocols for Hepatitis E Virus



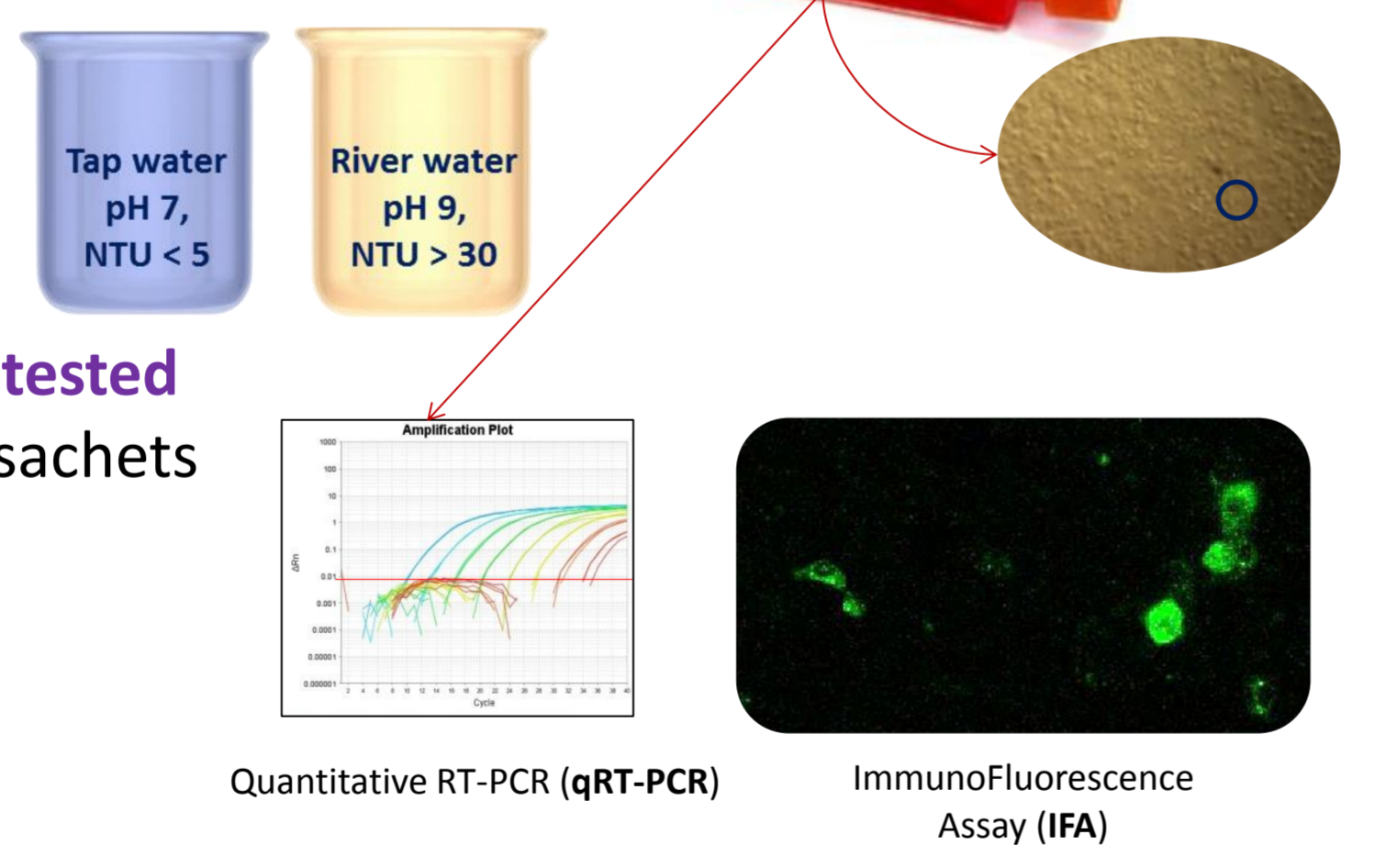
**Problem**  
There is **no existing evidence** of which is the **effective dosage and time of contact** of **disinfectant** (nor for chlorine neither for UV) **to inactivate Hepatitis E Virus** in water matrices.



**Solution**  
Creation of evidence-based Standard Operational Procedures for Hepatitis E Virus Water Disinfection in Humanitarian Context

### Methods

- Hepatitis E Virus grows in vitro**  
HEV strains **Sar55** Genotype 1 (infected rhesus macaque) and **Kernow-C1 p6** Genotype 3 (patient infected) were used infecting **Caco-2** (human colorectal adenocarcinoma cells) and **HepG2/C3A** (human epithelial hepatocellular carcinoma) cell culture lines.
- Different water matrices assayed**  
Low and high turbid waters
- Three different water treatments tested**  
Chlorine, UltraViolet light, Floc-Chlor sachets
- Viral doses quantified by**  
ImmunoFluorescence Assay (IFA)  
Quantitative RT-PCR (qRT-PCR)



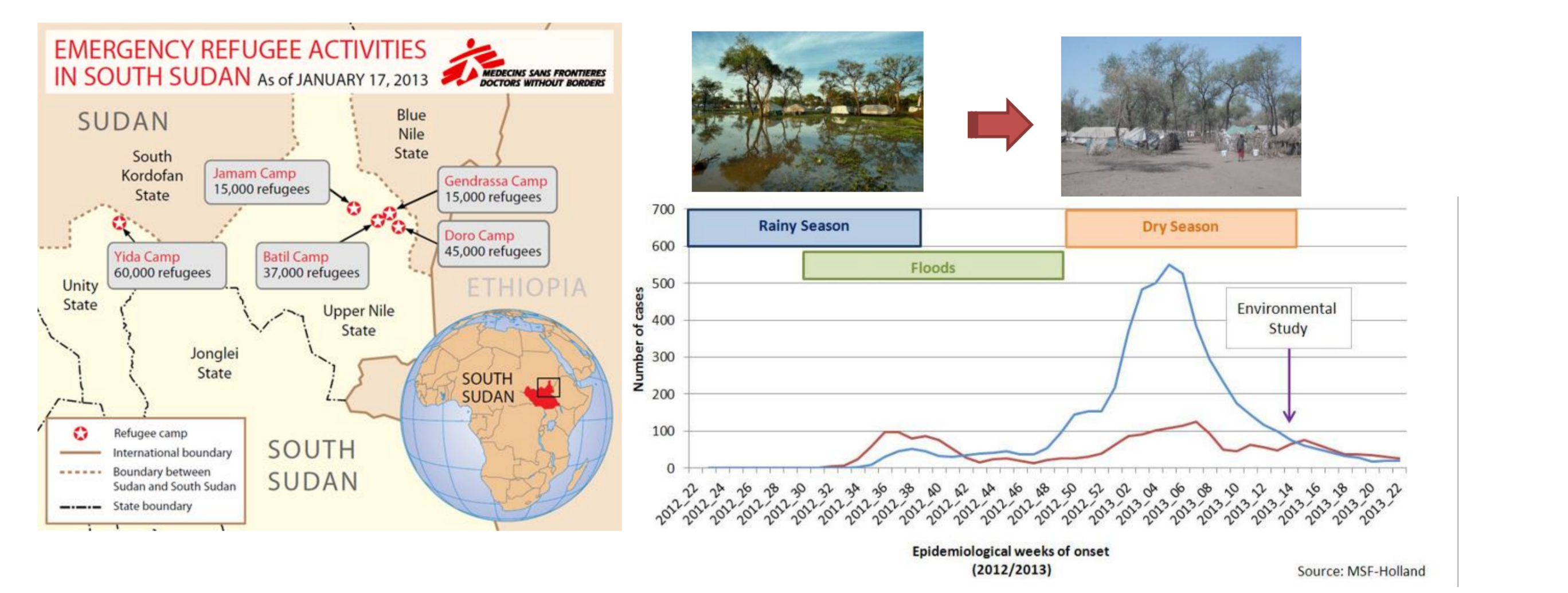
### Results

- Treatment recommendations of 0.5 mg/l Free Residual Chlorine after 30 min of contact time will reduce HEV (infective particles) in at least **99%**
- With an exposure to 100 J/m<sup>2</sup> in a 253.7nm low pressure lamp HEV (infective particles) reduces in **95.9%**
- After treatment with sachets in turbid water (> 30 NTU) HEV (viral particles) reduces: **79.6%** (PUR<sub>TM</sub>) and **91.5%** (WaterMaker<sub>TM</sub>)

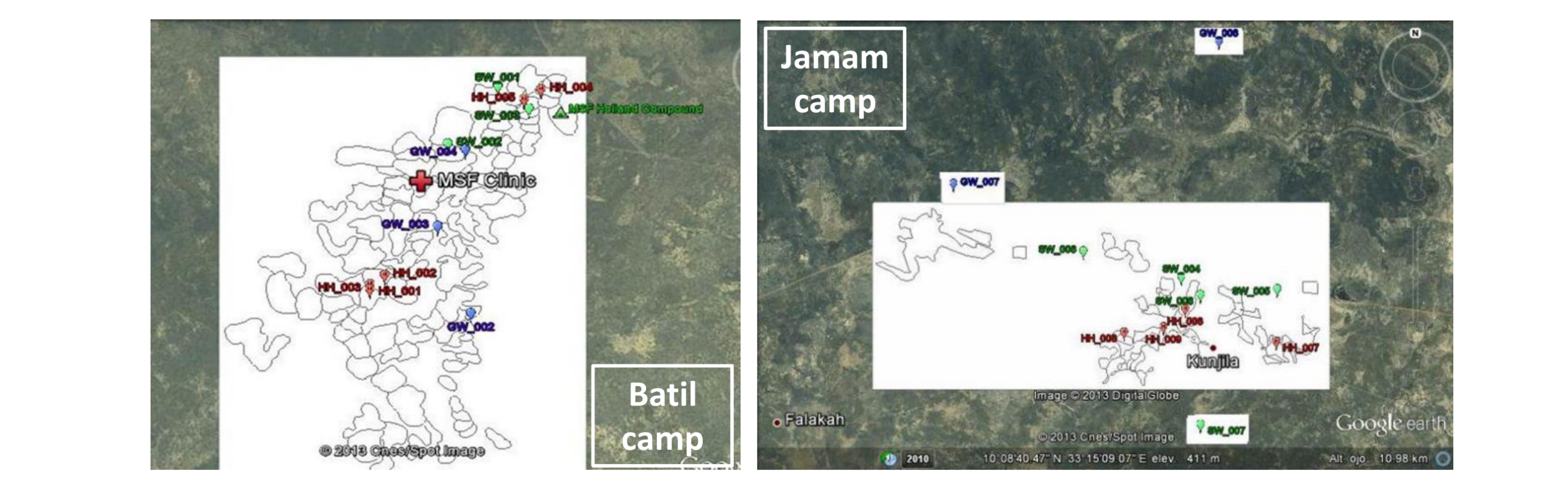
Finally, WADHE team (humanitarian expertise and scientific evidence) have developed **Standard Operational Protocols for HEV Outbreak Response**

TECHNICAL BRIEF HEPATITIS E OUTBREAK RESPONSE  
December 2014

### Environmental Investigation in South Sudan HEV outbreak



The environmental investigation focused on two camps: **Jamam** and **Batil** at the last phase of the South Sudan HEV outbreak  
Water samples at **Surface Level (8)**, **Groundwater Level (7)**, **Household Water Level (8)** and **Household Food Level** for testing on Human Adenovirus & Hepatitis E Virus



Environmental investigation elucidates the **potential sources and patterns** of HEV transmission in the affected camps showing **High risk of transmission at Household water level**

Type of Sample	Camp	Sampling location	Quantity (L or g)	Human Adenovirus (GC/L or GC/g)
Surface Water	Batil	SW1. Tapstand runover	10	ND
		SW2. Handpump runover	1	ND
		SW3. Tapstand runover	5	ND
		SW4. Halfir	8	ND
	Jamam	SW5. Halfir	10	ND
		SW6. Halfir	5	ND
		SW7. Shallow well	10	ND
		SW8. Halfir	5	ND
Ground Water	Batil	GW1. Open Well	10	ND
		GW2. Borehole	10	ND
		GW3. Borehole	20	ND
		GW4. Borehole	20	ND
	Jamam	GW5. Borehole	10	ND
		GW6. Shallow well	10	ND
		GW7. Borehole	10	ND
		GW8. Shallow well	10	ND
Household Water	Batil	HW1. Water storage	10	ND
		HW2. Water storage	5	130.75
		HW3. Water storage	2	2.18
		HW4. Water storage	10	71.87
	Jamam	HW5. Water storage	10	ND
		HW6. Water storage	7	ND
		HW7. Water storage	10	ND
		HW8. Water storage	8	16.55
Household Food	Batil	HF1. Uncooked Kisra*	34.45	ND
		HF2. Uncooked Kisra	24.8	ND
		HF3. Uncooked Kisra	30.8	ND
		HF4. Uncooked Kisra	30.5	0.7
	Jamam	HF5. Cooked Kisra	26.25	ND
		HF6. Cooked Kisra	30.6	ND
		HF7. Cooked Kisra	28.5	ND
		HF8. Cooked Kisra	30.8	ND

\* Kisra is a thin pancake-like leavened bread made from whole sorghum flour