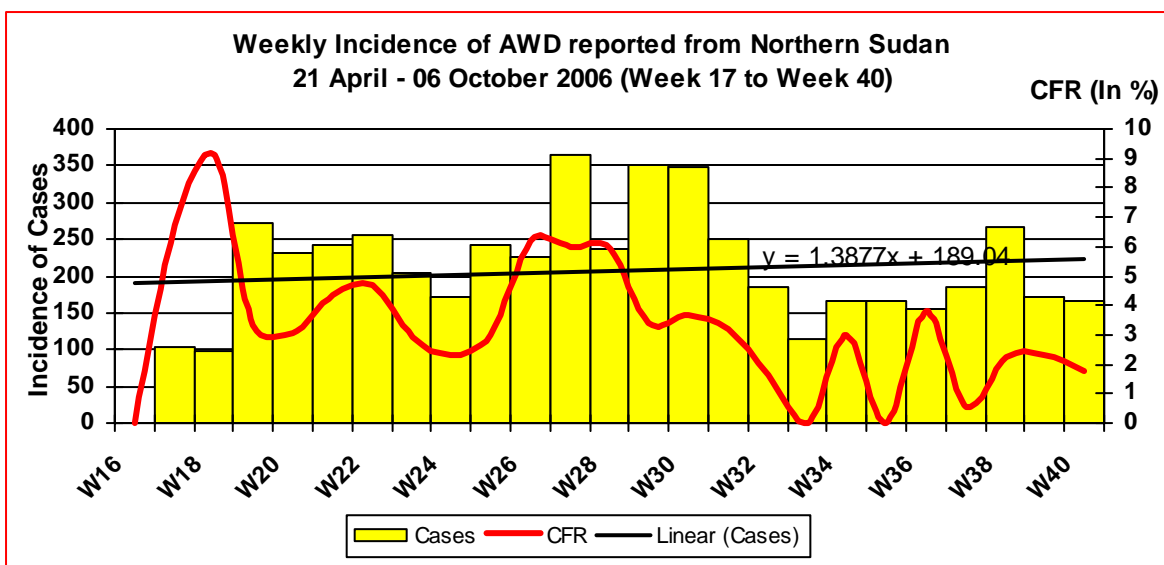


## 1. Overview

Between 21 April and 6 October 2006, the Federal Ministry of Health (FMOH) has reported 8,437 cases including 244 deaths (case fatality rate of 2.9%) from cholera in northern Sudan. A summary of the current situation is as follows:

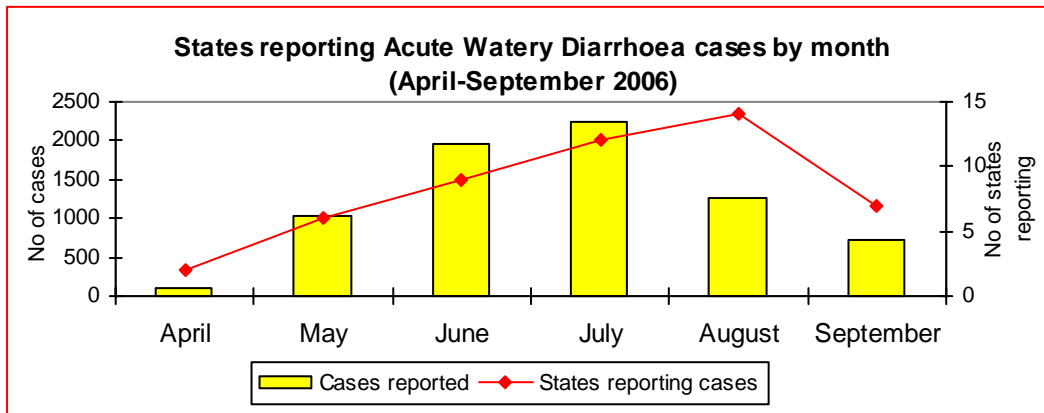
- Eight out of fifteen states of northern Sudan are, currently, reporting cases of cholera. The outbreak eventually spread to all fifteen states of northern Sudan and Sennar is the last of the fifteen states where the outbreak had spread to last week. Seven states of northern Sudan are now reporting "zero cases" for the last few weeks. *Vibrio cholerae* 01 serotype *Inaba* has been laboratory confirmed by the National Public Health Laboratory (NPHL) of Sudan in 135 (43.6%) out of 310 stool samples collected so far from these cholera cases including those collected from the Sennar state;
- Repeat laboratory analysis of selective positive isolates of *Vibrio cholerae* conducted at NAMRU-3 has confirmed that all the strains belonged to bio-type *El Tor* and sero type- 01 *Inaba*. Further characterization of these positive isolates using molecular technique is now being carried out by NAMRU-3;
- Of the reported cholera cases, 19% have occurred in North Kordofan state (CFR: 3%), 17% in South Darfur (CFR: 2.4 %) and 12% have occurred in Khartoum state (CFR: 4%);
- The overall case fatality rate of the cholera outbreak during the reporting period (21 April-06 October 2006), remains at 2.9%. The death rate broken down by states ranges between 1 to 5%.
- The FMOH has formed a cholera task force to coordinate the overall public health response to the outbreak. WHO is actively participating in the task force assuming the overall responsibility for epidemic risk assessment, surveillance and standardizing case management;
- Except in Darfur, where the outbreak is still spreading, cholera cases are steadily decreasing in most of the other states signifying that the outbreak, though not fully stopped, might be weakening nearly 24 weeks after the outbreak began in northern Sudan on 21 April, 2006;
- Although, the death rate is coming down, the challenge remains now to prevent deaths at community level, particularly in some of the very inaccessible and remote pockets of Darfur where the worsening security situations and escalation of violence are making it difficult for the health services providers and the humanitarian health workers to reach out to those in acute need and patient care.



## 2. Situation assessment

The current outbreak started on 21 April 2006 in Khartoum state and then rapidly spread to other neighbouring states. Seasonal factors such as the rainy season along with population movements between the states might have contributed to this rapid spread amongst the vulnerable populations living in unsanitary conditions in these states. The weekly progression of the disease, as has been depicted in the epidemic curve, shows that the peak of the outbreak might have occurred between epidemiological week 27 and 30 and despite improvement in surveillance system and increase in number of states reporting cases of cholera, the trend to decline is observed in almost all the states except in Darfur. For example, as opposed to week 27 to 31 when an average of 300 to 350 cholera cases were reported throughout the country, a weekly incidence of around 150 to 170 cases are, currently, being reported from the country.

The cumulative incidence of cholera increased from 113 in April to 2,255 cases reported in July, 2006. During the same period, the number of states reporting cases of cholera increased from 2 to 12 states. In August 2006, only 1,260 cases were reported signifying a perceptible decrease in the number of reported cases despite the fact that the number of states reporting cholera cases increased to 14 in August, 2006. Comparatively, only 723 cholera cases were reported in September from seven states of northern Sudan registering a sharp decrease by 42% over cases reported in the previous month and by over 68% compared to cases reported in July when the peak of the outbreak occurred. The situation has not yet stabilized in Darfur where cases continue to be reported from inaccessible pockets and where in view of the precarious security situation prevailing, the control measures are becoming extremely difficult to implement and thereby stop the transmission.



Since the causative strain of this outbreak was new to Sudan (in all past documented outbreaks of cholera in Sudan, the causative strain was *Vibrio cholerae* O1 sero type *Ogawa* and not *Inaba*), the death rate peaked over 9% during the initial weeks of the outbreak and after some cyclical fluctuations, death rate started to decline beginning in week 29. However, during week 34 and 36, the weekly death rate again spiked to above 3% and this spike, mostly, corresponded to deaths reported during the same period from some inaccessible areas of Darfur. Three deaths (2 deaths in North Darfur and 1 death in South Darfur) were reported from Darfur this week (week 40) pushing the overall weekly death rate to about 1.8%.

The microbial sensitivity test of the causative strain of this outbreak conducted at NAMRU-3 shows that all strains were sensitive to Doxycycline except one strain which was multiple drug resistant.

Table-1: Cumulative incidence of Acute Watery Diarrhoea reported from Northern Sudan: 21 April-06 October

State	Date of reporting of "first/index" case	Cumulative number of cases reported till 06 October 2006*	Cumulative number of deaths reported till 06 October 2006	Overall CFR
**Khartoum	21/04/2006	1019	41	4 %
**North Kordofan	25/04/2006	1606	47	3 %
White Nile	17/05/2006	782	21	2.6%
**South Darfur	30/05/2006	1468	35	2.4%
South Kordofan	02/06/2006	554	16	2.8%
River Nile	14/05/2006	573	20	3.5%
Al Gezira	30/06/2006	120	5	4.1%
**Gedaref	08/07/2006	861	12	1.4%
**Kassala	29/06/2006	786	25	3.2%
**North Darfur	18/08/2006	219	6	2.7%
**Sennar	02/10/2006	83	2	2.4%
**West Darfur	09/08/2006	242	8	3.3%
Other states (Northern Blue Nile and Red sea states)		124	6	4.8%
<b>Total</b>		<b>8437</b>	<b>244</b>	<b>2.89%</b>

### 3. Ongoing control measures

WHO is working with the FMOH providing technical support for control and management of the ongoing outbreak. Public health control measures like improvement of environmental health, particularly chlorination of public water supplies and hygiene promotion have been stepped up in all the states still reporting cholera cases. The Water and Environmental Sanitation Department of the government with support from UNICEF, and NGOs are involved in chlorination of public water supplies in all the affected states. In Darfur, in particular, WHO is actively engaged in ensuring microbial quality standards of the drinking water in the IDP camps.

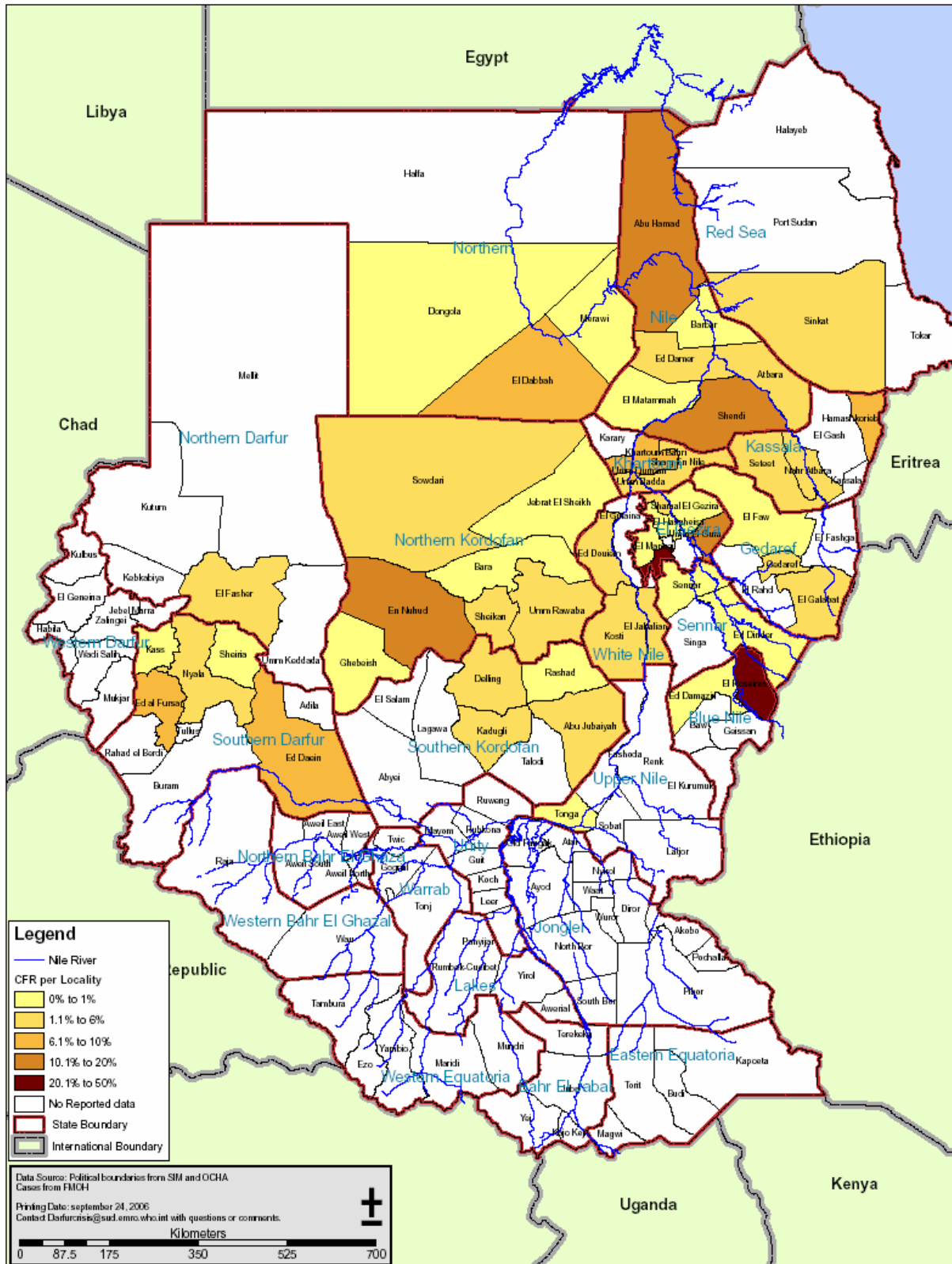
### 4. WHO's Response

Since the beginning of this outbreak in northern Sudan, WHO is actively engaged in the following areas of work:

- **Surveillance:** A surveillance system for cholera has been set up at federal and state level with automated report generation and mapping facilities;
- **Case management:** Apart from distributing case management guidelines and treatment protocol at the Cholera Treatment Centres, eleven pre-packaged cholera kits have been sent to the affected states through the FMOH which are adequate to treat over 6,500 cases using a standard case management guidelines;
- **Laboratory diagnostics:** With WHO's assistance, laboratory diagnostics capacity of at least seven state laboratories in northern Sudan have been strengthened for detection and laboratory confirmation of *Vibrio Cholera*. In addition, the institutional capacity of NPHL of Khartoum has been built up, with technical assistance from NAMRU-3, for bio and sero-typing of *Vibrio Cholera* including molecular characterization of the positive strains.
- **Assessment and monitoring:** Two international environmental health engineers were deployed in the affected areas for assessing the environmental sources of contamination responsible for the recent outbreak. In addition, the quality of the ongoing response to the outbreak is being assessed real-time through the use of some "proxy" indicators.

### Map showing Case Fatality Rate by Localities from Cholera Outbreak in Northern Sudan : 21 April - 04 September 2006

Map Ref No: 2006-0063



Disclaimer: The presentation of material on the map contained herein does not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or areas or its authorities or its frontiers or boundaries.