

Ghana (West Africa)

Population (2005) :	22'113'000
% of urban population :	46
Total number of cases (n) :	1'830
Total number of deaths (n) :	575
Average case-fatality rate (%) :	31
Year of introduction of yellow fever vaccine in routine immunization :	1992

Figure : Yellow fever cases reported in Ghana, 1950-2004

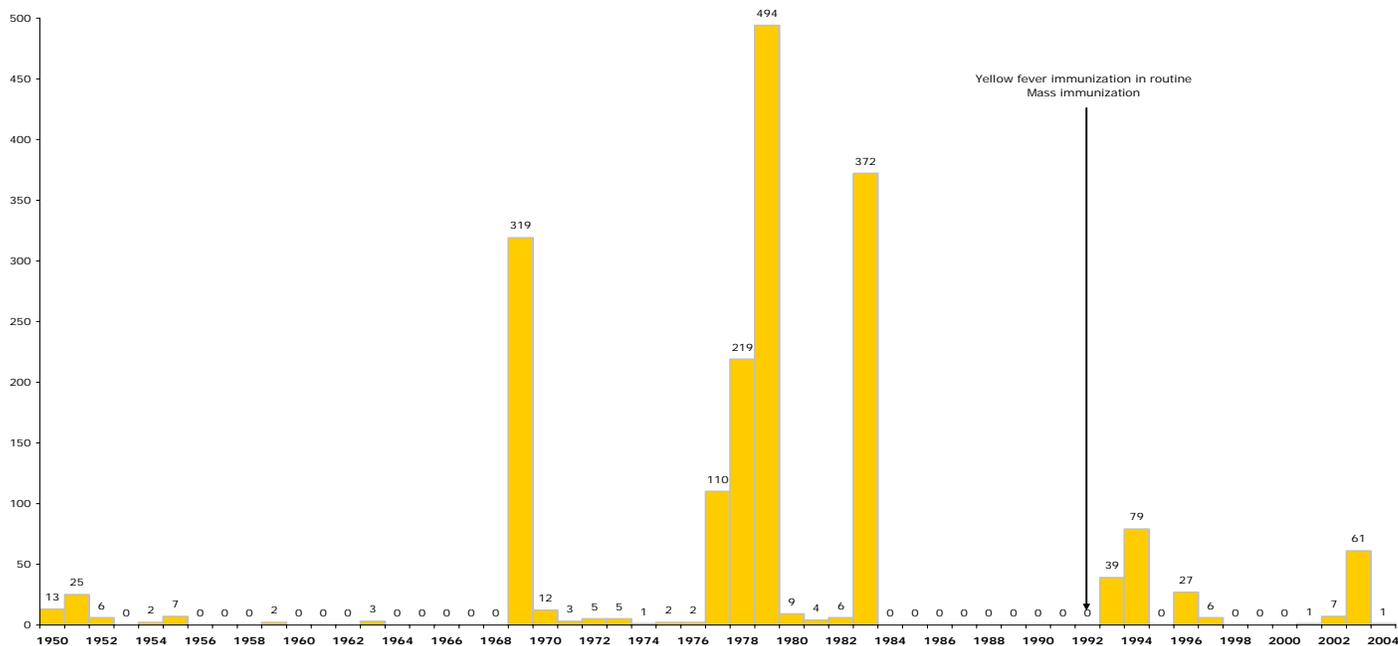


Table : Yellow fever cases, deaths, case-fatality rate (CFR) and vaccine coverage in Ghana, 1950-2004

Year	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Cases (n)	13	25	6	0	2	7	0	0	0	2	0	0	0	3	0	0	0	0	0	307
Deaths (n)	5	15	6	0	1	6	0	0	0	2	0	0	0	3	0	0	0	0	0	72
CFR (%)	38	60	100	0	50	86	0	0	0	100	0	0	0	100	0	0	0	0	0	23
Vaccine coverage (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Cases (n)	12	3	5	5	1	2	2	110	219	494	9	4	6	372	0	0	0	0	0	0
Deaths (n)	7	0	4	4	1	2	2	33	40	120	7	1	4	201	0	0	0	0	0	0
CFR (%)	58	0	80	80	100	100	100	30	18	24	78	25	67	54	0	0	0	0	0	0
Vaccine coverage (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Cases (n)	0	0	0	39	79	0	27	6	0	0	0	1	7	61	1					
Deaths (n)	0	0	0	15	11	0	5	0	0	0	0	1	0	7	0					
CFR (%)	0	0	0	38	14	0	19	0	0	0	0	100	0	11	0					
Vaccine coverage (%)	0	0	3	33	22	24	28	60	4	60	74	87	99	77	81					

Background :

- ✓ 3rd in descending order of total number of notified yellow fever cases in Africa since 1950.
- ✓ Since 1901, yellow fever has been reported in Ghanaian epidemiological annual reports.
- ✓ **Urban outbreaks** : Jiripa and Wa (1983-1984).
- ✓ **Has the capacity to laboratory confirm yellow fever** (serology using ELISA antibody capture).
- ✓ **Rainy season** :
 - Northern Ghana : June - September.
 - Southern Ghana : May - October.

Yellow fever events :

- ✓ **1963 : Ashanti (Kamusi) and Northern (Damongo) regions.**
 - 1 yellow fever case was officially reported in Kamusi and 2 in Damongo. This was the first notification of yellow fever in the Ashanti region.

- ✓ **August 1969-1970 : Northern (Western Dagomba), Upper East (Bawku East, Bawku West), Upper West (Lawra) regions. Jirapa, Namdon, Navrongo, Paga and Sandema districts.**
 - Yellow fever had not been reported in Ghana for 6 years. The outbreak began in Western Dabonga district and spread through the border with Burkina Faso.
 - 319 cases, including 79 deaths, were officially notified (CFR 25%). At least 2 cases were laboratory confirmed. The outbreak had allegedly affected all sexes and age- groups indiscriminately.
 - *Aedes aegypti* was allegedly the predominant vector.
 - To respond to the outbreak, mass vaccination campaigns were carried out in the Northern part of the country, especially in the Northern and Upper West regions.

- ✓ **1970 : Bong- Ahafo region. Berekum, Dormaa Ahenkro and Hwidiem districts.**
 - 12 cases, including 7 deaths, were officially notified (CFR 58%)

- ✓ **August 1977- end of 1979 : Summary.**
 - Upper West, Eastern, Volta and Western part of Brong-Ahafo regions.
 - The outbreak began in the Upper West region and gradually moved to South. In 1978, the virus circulation spread to Eastern and Volta regions, and then, in 1979, to Brong-Ahafo and to the area of Greater Accra, around the capital city.
 - In total, 823 cases, including 193 deaths, were officially notified (CFR 23%). 49 cases were laboratory confirmed by serology or histopathology.
 - *Aedes aegypti* was the predominant vector.
 - To respond to the outbreak, 485 356 persons were vaccinated in the affected areas.
 - Yellow fever surveillance was difficult at this time due to a high incidence of viral hepatitis in this area.

- ✓ **August 1977 - February 1978 : Jirapa and surroundings, Upper West region.**
 - The outbreak began during the end of the rainy season and mainly occurred during the dry season. The epidemic peak was observed in October 1977.
 - 136 cases, including 34 deaths, were officially notified in Jirapa and in 32 surrounding villages (CFR 25%). 9 cases were laboratory confirmed by serology or histopathology. 68% of the cases and 82% of the deaths occurred in children under 15. The rest of the population was protected by the mass immunization campaigns undertaken in this region in 1969.
 - *Aedes aegypti* was the predominant vector.

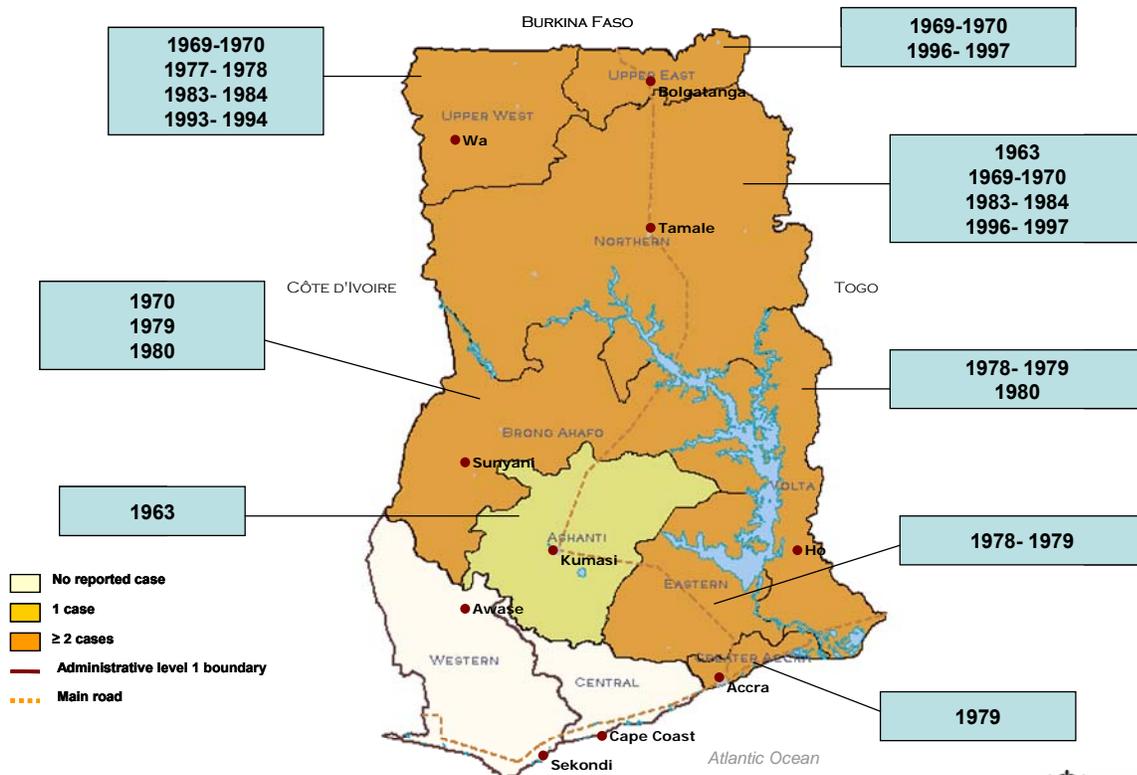
- ✓ **March 1978 - September 1979 : Eastern region.**
 - The outbreak began during the rainy season in a village close to Tafo and then spread to numerous surrounding villages in this region.
 - 207 cases, including 44 deaths, were officially notified (CFR 21%). Some cases were laboratory confirmed.
 - *Aedes aegypti* was the predominant vector.

- ✓ **August 1978 - February 1979 : Volta region and more than 33 villages located between Jasikan, Hohoe and Kpando.**
 - The outbreak began during the rainy season and continued during the dry season. The epidemic peak was observed in January 1979.
 - 340 cases, including 53 deaths, were officially notified within a population of 90 854 inhabitants (CFR 16%). 29 cases were laboratory confirmed by serology or histopathology.
 - 67% of the cases and 80% of the deaths occurred among adults over 15 years of age . The average incidence was 2.9 cases / 1 000 inhabitants . The maximum attack rate was observed between 15 and 44 years (4.2 cases / 1 000 inhabitants). Within this age group, males had an exceeding incidence (5.9/1 000) compared to females (2.5/1 000). This repartition of cases evokes an extra- domiciliary contamination. No preventive immunization campaign was previously undertaken in this region
 - *Aedes aegypti* was the predominant vector.

- ✓ **June - September 1979 : West part of the Brong-Ahafo region (Berekum, Dormaa Ahendro, Hwidiem, Techiman, Wenchi).**
 - The epidemic peak was observed in August , during the rainy season.
 - 104 cases, including 46 deaths, were officially notified (44% CFR). Several cases were laboratory confirmed. In 1977, 2 fatal cases of yellow fever were reported in this region.

- ✓ **1979 (continuation) : Greater Accra**
 - 4 fatal cases of yellow fever were officially notified in the Greater Accra agglomeration. These cases were laboratory confirmed by histopathology. They were suspected to be infected in the Eastern region.
- ✓ **January - December 1980 : Brong- Ahafo and Volta regions.**
 - 8 cases, including 6 deaths were officially notified (CFR 75%).
- ✓ **July 1983 - May 1984: Northern and Upper West regions. Jiripa and Wa districts.**
 - The outbreak affected an area bordering the Côte d'Ivoire's districts that had experienced a yellow fever epidemic in April - May 1982 (M'Bahiakro sub- prefecture, by Bouaké. 90 cases, including 25 deaths. *Aedes aegypti*). This outbreak is related to the epidemic that hit several districts of Burkina Faso in October 1983 (Fada N'Gourma, Manga, Ouagadougou and Tenkodogo).
 - The outbreak was notified 4 weeks after the identification of the first cases. It began in the West Gonja district, in the West area of the Northern region. Then, it spread to North- East and to the Eastern part of the Upper East region, neighboring Burkina Faso. 19 villages were affected. The epidemic peak was observed in February 1984 (28 cases, including 5 deaths, for this single month).
 - 372 cases, including 201 deaths, were officially notified (CFR 54%).
 - *Aedes aegypti* was the predominant vector.
 - To respond to the outbreak, 300 000 people were vaccinated in the affected region and the bordering areas (Northern and North- East regions). The vaccination campaign was launched in January 1984.
- ✓ **1992 :** A national immunization campaign was conducted while introducing the yellow fever vaccination in routine (no data available on vaccine coverage).
- ✓ **October 1993 - May 1994 : Upper West region. Jiripa district.**
 - 37 villages were affected . The epidemic peak was observed in February 1994.
 - 118 cases, including 26 deaths, were officially notified (CFR 22%). 9 cases were laboratory confirmed. 54% of the cases were aged under 15. The M/F sex ratio was 2.
 - To respond to the outbreak, a mass immunization campaign was launched in January 1994 in the 37 villages located in the affected area and in the bordering districts of the Upper East and Northern regions.
- ✓ **November 1996 - beginning of 1997 : Upper-East (Bawku East, Bolgatanga, Builsa, Kassena-Nankana, Bawku West and Bongo districts) and Northern (East and West Mamprusi districts) regions.**
 - The outbreak began in the Bawku East district, mainly in the area of Garu. Bawku East was the most affected district. The outbreak was notified 5 weeks after the identification of the first cases.
 - 33 cases, including 5 deaths, were officially notified (CFR 15%). 7 cases were laboratory confirmed, among the 118 samples taken. 175 cases of jaundice, including 34 deaths, were identified as suspected cases of yellow fever (CFR 19%).
 - To respond to the outbreak, 140 000 people were vaccinated in the Bawku East and West Mamprusi districts.

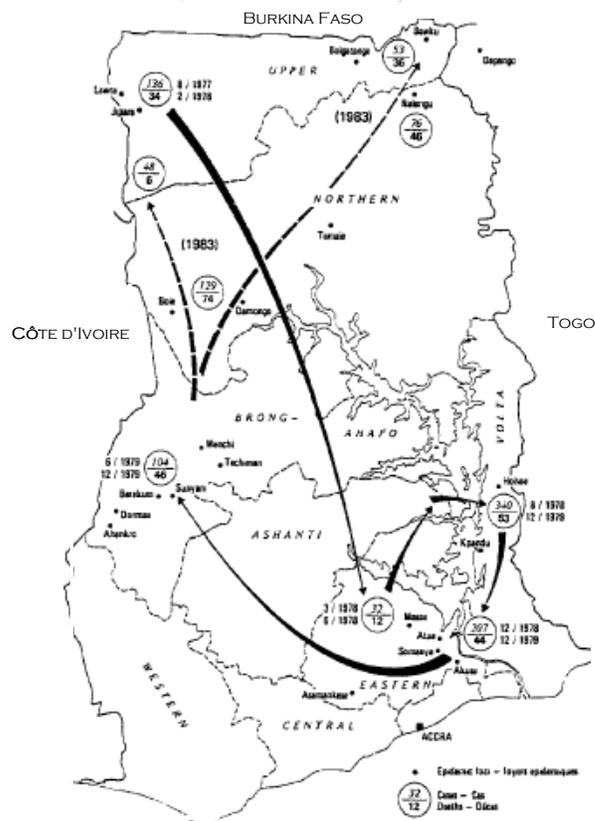
Yellow fever cases reported in Ghana, 1950- 2004



The boundaries and names shown and the designations used on this map do 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 area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

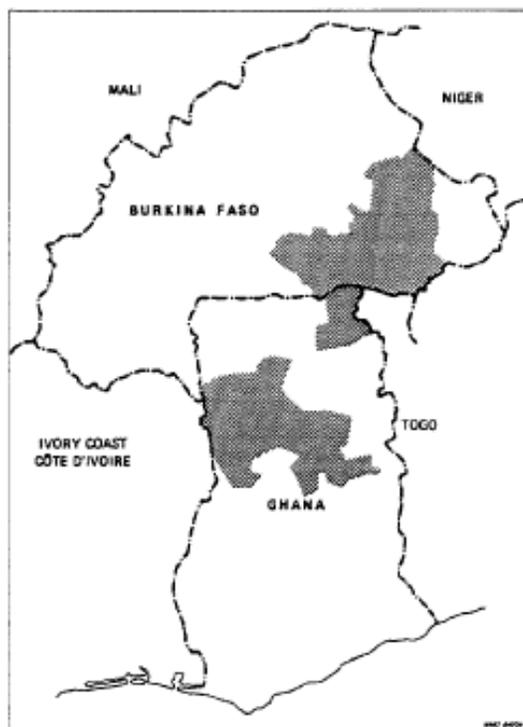


Yellow fever outbreaks, Ghana, 1977-1979, 1983



(Source: *Wkly Epidemiol Rec.* 1984;59(43))

Areas affected by the yellow fever epidemic, Ghana and Burkina Faso, 1983



(Source : *Wkly Epidemiol Rec.* 1984;59(44))

Bibliography:

1. The yellow fever situation in Africa and South America in 2004. *Wkly Epidemiol Rec.* 2005 July 22;80(29):250-56.
2. Osei-Kwasi M, Dunyo SK, Koram KA, Afari EA, Odoom JK, Nkrumah FK. Antibody response to 17D yellow fever vaccine in Ghanaian infants. *Bull World Health Organ.* 2001;79(11):1056-9.
3. Yellow fever, 1996- 1997. Part I. *Wkly Epidemiol Rec.* 1998 Nov 13;73(46):354-59.
4. Yellow fever in 1994 and 1995. *Wkly Epidemiol Rec.* 1996 Oct 18;71(42):313-18.
5. Expanded Programme on Immunization (EPI), Inclusion of yellow fever vaccine in the EPI, Gambia. *Wkly Epidemiol Rec.* 1996 June 14;71(24):181-85.
6. Addy PA, Esena RK, Atuahene SK. Possible contributing factors to the paucity of yellow fever epidemics in the Ashanti region of Ghana, west Africa. *East Afr Med J.* 1996 Jan;73(1):3-9.
7. Yellow fever in 1992 and 1993. *Wkly Epidemiol Rec.* 1995 March 10;70(10):65-69.
8. Yellow fever, Ghana. *Wkly Epidemiol Rec.* 1994 Aug 26;69(34):260.
9. Yellow fever, Ghana. *Wkly Epidemiol Rec.* 1994 Aug 12;69(32):243.
10. Yellow fever virus surveillance in Western Africa. *Wkly Epidemiol Rec.* 1994 Apr 1;69(13):93-5
11. Corrigendum, Yellow fever in Ghana. *Wkly Epidemiol Rec.* 1994 March 11;69(10):76.
12. Yellow fever, Ghana. *Wkly Epidemiol Rec.* 1994 Feb 11;69(6):44.
13. Yellow fever in 1987. *Wkly Epidemiol Rec.* 1989 Feb 10;64(6):37-43.
14. Addy PA, Minami K, Agadzi VK. Recent yellow fever epidemics in Ghana (1969-1983). *East Afr Med J.* 1986 Jun;63(6):422-34.
15. Agadzi VK, Boatman BA, Appawu MA, Mingle JA, Addy PA. Yellow fever in Ghana, 1977-80. *Bull World Health Organ.* 1984;62(4):577-83.
16. Corrigendum-Yellow fever in 1983. *Wkly Epidemiol Rec.* 1984 Oct 26;59(44):342.
17. Yellow fever in 1983. *Wkly Epidemiol Rec.* 1984 Oct 26;59(43):329-35.
18. Yellow fever in 1979. *Wkly Epidemiol Rec.* 1980 Nov 07;55(45):345-51.
19. Yellow fever in 1978. *Wkly Epidemiol Rec.* 1979 Oct 12;54(41):314-18.
20. Surveillance of yellow fever. *Wkly Epidemiol Rec.* 1979 Sept 14;54(37):281-82.
21. Yellow fever in 1977. *Wkly Epidemiol Rec.* 1978 Dec 01;53(48):345-49.
22. Yellow fever in 1969. *Wkly Epidemiol Rec.* 1970 Nov 27;45(48):529-33.