

# Smallpox and its Eradication from the South-East Asia Region

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**World Health  
Organization**

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# Introduction

Smallpox, which is believed to have originated over 3000 years ago in India or Egypt, is one of the most devastating diseases known to humanity. The causative agent, variola virus, a member of the genus Orthopoxvirus, is relatively stable in the natural environment.

The virus existed in more than one form, some producing more severe illness than others. South Asia was home to the more virulent strain of the disease, variola major. Variola major could inflict a heavy loss of life amongst non-immunized populations; killing 25 to 50 per cent of those infected. At times it mutated into the deadly haemorrhagic form which caused rapid death from cardiovascular collapse. The less virulent form, variola minor (or alastrim) had much lower mortality rates, as low as 1 per cent, and was prevalent in Europe and North Africa.

The disease was most infectious at the appearance of the earliest lesions, the patient of smallpox remained infectious to others mostly through droplet spread until the disappearance of all scabs. Alternative routes of infection were skin inoculation, conjunctival contact or transplacental transmission.

Humans are the only known host. All non-immunized persons are susceptible but children are more affected. Incubation period ranged from 7 to 17 days with an average of 10 – 14 days. Epidemics tended to develop comparatively slowly. The interval between each generation of cases is two to three weeks. When natural outbreaks occurred, the initial, or “index”, case rarely infected as many as five other persons, even during the peak transmission season.

The striking aspect of variola major was its well-defined features: high fever, deep rashes, oozing pustules and a putrid smell. A large percentage of the victims tended to die from bleeding, secondary infections and shock. The disease manifests in various stages: prodrome, early rash with papules, progressing to vesicles and pustules which eventually begin to form crusts with scabbing. The rash tends to progress uniformly in a given patient, i.e., at any point in time in a patient rash manifests as all papules, all vesicles or all pustules. The scabs eventually fall off to leave behind deeply pitted pock marks on the skin, especially on the face; the entire disease course taking about three weeks.

**SMALLPOX THREAT**

**WHAT IS SMALLPOX?**

- Airborne virus, highly contagious
- Caused by variola virus
- Virus related to monkeypox
- Could take approximately 6 weeks to seed smallpox cases around the world
- Each infected individual infects an average of 20 others
- **Early symptoms** High fever, fatigue and rash
- Resulting spots fill with clear fluid and pus then form a crust and fall off
- Fatality rate ranges from 15 to 50 percent
- **Treatment** Vaccination (vaccinia) to prevent infection
- During the first four days after exposure
- Current U.S vaccine stock-pile was produced in 1970s and contains 7.5 million doses
- To be kept on shelves and used in confirmed cases only

**EFFECTS ON HUMAN BODY**

1 Spreads through saliva droplets in an infected person's breath

2 Skin

- Incubation period of 7-17 days after exposure
- Infectious once rash develops and first week of illness

**HISTORY**

- 1976 WHO urges labs worldwide to destroy retained stocks of variola virus
- 1977 Last known natural case - Somalia
- 1978 Laboratory accident in Birmingham, England, kills one and causes a limited outbreak
- 1983 South Africa - last country to destroy its virus stock

Source: WHO

REUTERS

## Historical burden of disease in the Region and control attempts

In colonial South Asia the discovery of a few cases was often considered to represent a prelude to the unravelling of a massive epidemic and innumerable deaths. A variety of players – medical, political, religious and social – looked for effective means to control its spread. Variety of approaches coexisted side by side: from the isolation of those stricken with the disease, to religious ceremonies (the worship of the goddess Sitala was widespread in South Asia), to the inoculation of humans with live variola virus (variola) or more benign animal pox - based (vaccinia) viruses (vaccination).

Because of the frequent and devastating outbreaks in the Region, the WHO Regional Committee for the South-East Asia Region had recommended concerted action against smallpox in 1949, long before the initiation of global action against the disease by WHO. South Asia was a major focus of endemic variola, causing WHO to scrutinize the situation in this region carefully. Yet, Asia continued to have almost 80 per cent of the global burden of smallpox in the late 1960s, with half of the Asian burden borne by India alone.

Attempts seem to have been made by several administrators in Asia and Africa in the nineteenth and early twentieth centuries to banish variola from their jurisdictions. A concerted call to eradicate the disease was made by WHO in its World Health Assembly in 1958. National governments drew up plans that were essentially based on achieving 100 per cent vaccine coverage within three to five years. WHO was committed to provide technical assistance and inter-regional coordination.

The Democratic People’s Republic of Korea reported its last case in 1961 and Thailand reported its last case the following year. Myanmar, (then Burma), vaccinated 90 per cent of its entire population between 1963 and 1966 and suffered no more smallpox except for an outbreak of 250 cases in 1968-1969, following an importation from East Pakistan. Indonesia achieved freedom from smallpox before World War II, but the disease was reintroduced in 1947, and during subsequent years became endemic in Java and the other islands. During the period 1958 to 1965, the reported incidence increased sharply, from 121 cases in 1958 to 46 000 in 1965.

A very uneven application of control measures in several Member States, especially in South Asia, allowed the disease to remain firmly entrenched in the Region. To respond to this refractoriness, WHO launched an intensified plan in 1967 to eradicate smallpox with the basic strategy of smallpox vaccination campaigns, surveillance and containment of outbreaks.

Annual number of smallpox cases by continent, 1959-1966\*\*

Continent	1959	1960	1961	1962	1963	1964	1965	1966	1967*
Africa	16 307	16 823	26 060	24 329	16 863	12 506	16 784	14 127	9 554
Asia	71 309	39 843	53 957	63 616	98 784	43 537	39 145	50 494	50 958
Europe	26	47	24	136	129	--	1	71	3
North America	--	--	--	--	--	--	--	--	--
South America	5 490	7 931	9 026	9 718	7 151	3 398	3 515	3 092	426
Oceania	--	1	--	--	--	--	--	--	--
<b>Total</b>	<b>93 132</b>	<b>64 645</b>	<b>89 067</b>	<b>97 800</b>	<b>122 927</b>	<b>54 441</b>	<b>59 445</b>	<b>67 784</b>	<b>60 941</b>

\*\*Consolidated data compiled by WHO from various sources; \*Until 15 July 1967

Source: *Smallpox Eradication – Report of a WHO Scientific Group: World Health Organization Technical Report Series, No. 393* (Geneva: WHO, 1968)

Smallpox cases in India and the world, 1960-1977

Year	India	World	India/World Percentage
1960	31 091	65 737	47.3
1961	45 380	88 730	51.3
1962	55 595	98 700	56.3
1963	83 423	133 003	62.7
1964	41 160	75 910	54.2
1965	33 402	112 703	29.8
1966	32 616	92 620	35.2
1967	83 943	131 418	63.9
1968	30 925	80 213	37.8
1969	19 139	52 204	35.3
1970	12 341	33 663	36.7
1971	16 166	52 794	30.6
1972	20 407	65 153	31.3
1973	88 109	135 851	64.9
1974	188 003	218 364	86.1
1975	1 436	19 278	7.5
1976	Zero	953	--
1977	Zero	3,234	--

Source: R.N. Basu, Z. Jezek and N.A. Ward, *The Eradication of Smallpox from India* (WHO/SEARO: New Delhi, 1979), 36.

## Eradication from the Region

The strategy to eradicate smallpox employed by the Region was based on some of the basic principles of public health: enhanced surveillance, case finding, isolation, appropriate risk communication to the public and vaccination. The programme not only eradicated smallpox but also gave hope to those committed to serve in public health that certain diseases, no matter how severe and disruptive to human civilization, can be considered for eradication by applying these basic principles.

The campaign to eradicate smallpox in Indonesia was launched in 1968. Throughout Indonesia, 3130 vaccinators – approximately 1 for each subdistrict – and 324 regency supervisors conducted the programme. On average, this amounted to 1 vaccinator for every 39 000 persons. Improvement in the supervision and execution of the programme was needed at all levels and, to effect this, 13 “advance teams” (1 each in Jakarta, Jogjakarta and Bali, 2 in East Java and 4 each in West and Central Java) were established in January 1969. Frequent programme changes and improvements led to strengthened surveillance, widespread vaccination and containment measures. Indonesia reported its last case in January 1972. In the same year, Sri Lanka also reported its last case.

Eradication of smallpox from India was indeed a remarkable feat, with every house in each village visited several times by workers of the smallpox eradication programme. Every suspect case became a public health emergency and triggered immediate investigation. The Intensified Campaign involved over 152 000 Indian health workers and 230 WHO personnel from 30 different countries. The State of Bihar still remained recalcitrant with more than 35 000 cases and 10 000 deaths reported in May 1974. A thirty-year-old woman, infected in Bangladesh, became ill in Assam State on 24 May 1975, and would be the last case reported from India. Nepal’s last case was recorded one month earlier. The success of the Indian campaign reflected dedicated and imaginative leadership coupled with sound management at all levels—political, bureaucratic and operational. A national commission ensured strengthened surveillance and stringent documentation of all surveillance activities prior to the arrival of the International Commission for international certification of smallpox eradication in April 1977.

Bangladesh reported the last case from the Region and the whole of Asia on 16 October 1975. The eradication of the disease from Bangladesh was also the result of the active mobilization, organization



and diligent efforts of thousands of health workers, officials and experts from all levels of the health system. The effort started in the 1960s but climaxed in 1975. It required the provision of considerable resources, both national and international. Smallpox eradication activities in the field were undertaken by health officers and field workers: at village level over 10 000 family welfare workers; at *thana* level over 400 Thana Smallpox Officers; and at district level, 19 Civil Surgeons. With the emergency expansion of the programme in the early months of 1975, this was further

complemented by the huge influx of WHO short-term consultants. WHO also received considerable help in the rapid recruitment of the additional international staff in early 1975 from Centres of Disease Control and Prevention, Atlanta and international voluntary organizations, such as OXFAM.

## Global eradication



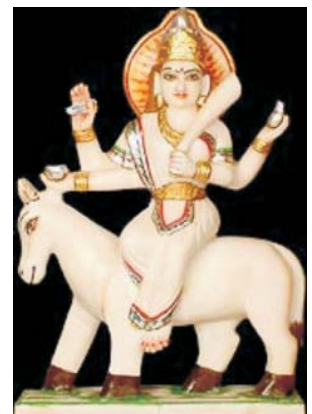
Ten years after the launching of the intensified plan to eradicate smallpox by WHO, the last instance of smallpox infection by natural route was recorded in Somalia, Africa. The very last patient of smallpox—from laboratory acquired infection—died in Birmingham, United Kingdom in 1978.

The global eradication of smallpox was certified, based on intense verification activities in countries, by a commission of eminent scientists in December 1979 and subsequently endorsed by the World Health Assembly in 1980.

For the past 30 years, populations the world over have breathed a sigh of relief at not having a single case of smallpox in their midst. This became possible because of two major strides in public health over two centuries of human quest: the first by Edward Jenner, a country physician and vaccination pioneer in England in 1798, and the second by WHO in 1958 when the World Health Assembly made the concerted call for global smallpox eradication.

## The Goddess

In the Indian subcontinent any story related to smallpox remains half-told without a mention of the Indian Goddess of Smallpox, Shitala Mata. The illness is considered by the peoples in the subcontinent to originate from a wrathful kiss by the goddess. There are several traditional accounts of the origin of the goddess, varying with geographic area and ethnicity. She has many names: Shitala in northern India, Mariyammai in the south, Mariatale, Jyeshtha, Rugboi, Patrgale in various parts of the subcontinent, including Ajima and Thakurani in Nepal. Whatever the local thoughts about her origin and the many names accorded to her, the cult was widespread in the subcontinent and her wrath



was feared. The illness was even welcome in many homes and the pock marks represented the “Kiss of the Goddess”. The intensified campaign launched by WHO in 1967 seems to have taken all that away from the subcontinent, the Region and the entire world for good.

## End of smallpox

One method used in the smallpox eradication campaign was the use of financial incentives to encourage people to report active cases. The rewards were small in the early stages, and became larger as the campaign neared its goal. This poster shows the last amount offered. It was never collected. Smallpox had indeed been eradicated.



Milestones in the eradication of smallpox	
1880	Last case of smallpox in Maldives
1939	No smallpox in Mongolia since December
1949	WHO Regional Committee for SEA recommends action against smallpox
1958	World Health Assembly calls for worldwide eradication of smallpox (WHA11.54)
1961	Last case of smallpox in DPR Korea
1962	Thailand reports its last case of smallpox
1966	Nineteenth World Health Assembly resolution on intensified programme for eradication of smallpox. Special Account established
1969	Last case in Myanmar on 25 July
1972	Last two known cases in Indonesia on 23 January Last case reported in Sri Lanka
1974	Bhutan's last three cases in February. Global Commission for the Certification of Smallpox Eradication certifies Indonesia free from smallpox on 25 April
1975	Last case reported on 6 April in Nepal Last case reported on 26 May in India Last case reported on 16 October in Bangladesh and in Asia
1977	Nepal certified free of smallpox on 13 April India certified free of smallpox on 23 April Bhutan certified free of smallpox on 23 April Last case of smallpox (variola minor) in the world – in Somalia on 26 October Myanmar certified free of smallpox on 30 November Bangladesh certified free of smallpox on 14 December
1978	Thailand Certified free of smallpox in December
1979	Global Commission for the Certification of Smallpox Eradication certifies on 9 December that smallpox has been eradicated from the world
1980	Thirty-third World Health Assembly declares "the world and all its people have won freedom from smallpox"



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