

## Chapters 23-28: The final phases of smallpox eradication and post-eradication challenges

These final chapters focus on the **last steps of the global smallpox eradication effort**, including **importations of smallpox into non-endemic countries, certification of eradication, and post-eradication policies**. Despite global vaccination efforts, **smallpox importations continued until the late 1970s**, often triggering localized outbreaks. Certification of eradication required **rigorous proof of disease elimination** in every country. Following the official declaration of eradication in **1980**, WHO shifted its focus to **post-eradication strategies**, including **vaccine stockpiling, laboratory safety measures, and surveillance of monkeypox**.

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### Chapter 23: Smallpox in non-endemic countries

While smallpox was being eradicated from **endemic countries**, cases **continued to be imported** into industrialized nations, particularly from **South Asia and Africa**. Between **1959 and 1974, 37 outbreaks occurred in non-endemic regions**, with **34 in Europe, 1 in Canada, and 2 in Japan**. Some of the **most notable outbreaks** included:

- **The Yugoslav Epidemic (1972)**: Imported from Iraq, resulting in a mass vaccination campaign.
- **The Birmingham Laboratory Outbreak (1978)**: A case caused by a lab accident, leading to the **last smallpox-related death**.
- **Airport and Travel-Related Cases**: Several outbreaks were linked to **air travel, refugees, and border crossings**.

Governments responded with **quarantine measures, emergency vaccination campaigns, and stricter travel regulations**. However, as the **WHO-led eradication program** advanced, these outbreaks became rarer.

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### Chapter 24: Certification of smallpox eradication

Certification was a **multi-step process** requiring **scientific verification that smallpox transmission had ended worldwide**. The WHO established **international commissions** to assess countries based on:

1. **Disease Surveillance Systems** – Ensuring **no undetected cases remained**.
2. **Pockmark Surveys** – Using **facial scarring studies** to identify past cases in remote areas.
3. **Laboratory Testing** – Confirming suspected cases were **not smallpox**.
4. **Public Reporting Systems** – Encouraging **citizens and healthcare workers to report possible infections**.

Countries were **formally declared free of smallpox in phases**, with the **final certification completed in 1979**.

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## Chapter 25: Certification in 29 endemic countries

Between **1973 and 1977**, WHO focused on certifying **the last endemic regions**. Special commissions reviewed **29 countries in Africa and Asia**, ensuring eradication through **on-the-ground verification**. The **most challenging countries** included:

- **India and Bangladesh:** Where **massive vaccination efforts and house-to-house searches** played a crucial role.
- **Sudan and Yemen:** Which suffered from **civil wars and refugee crises**, complicating efforts.
- **Iran, Iraq, and Saudi Arabia:** Where **pilgrimages (Hajj) created high-risk transmission zones**.

By **1977**, **smallpox transmission had been stopped globally**, but final certification required **two years of intensive monitoring**.

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## Chapter 26: Final certification of Africa and Asia (1978-1979)

After endemic transmission ended, **certification focused on 29 additional countries** that had historical cases but were **not major smallpox reservoirs**. This phase included:

- **Southern Africa:** Countries like **South Africa, Botswana, and Mozambique** required additional reviews due to **weak health infrastructures**.
- **Southwestern Asia:** **Iran, Iraq, and the Gulf States** implemented surveillance and containment policies.
- **Southeastern Asia:** WHO teams worked in **Thailand, Laos, and Vietnam**, where smallpox was historically present but **not well-documented**.

These reviews **confirmed no remaining smallpox cases**, and the program prepared for the final **global certification**.

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## Chapter 27: The last steps – The Horn of Africa and China

The final **certification efforts focused on two regions**:

1. **The Horn of Africa (Ethiopia, Somalia, Djibouti, Kenya)** – The **last known smallpox case** was reported in **Somalia in 1977**. Due to ongoing **conflicts, nomadic populations, and refugee movements**, special measures were needed, including **cash rewards for reporting cases**.
2. **China** – Though smallpox was eliminated earlier, WHO had **no direct access to Chinese eradication efforts** until 1979. A team **verified surveillance data, vaccine records, and laboratory containment policies** before confirming eradication.

The **final certification** took place on **October 26, 1979**, exactly **two years after the last recorded smallpox case**. WHO formally declared smallpox eradicated on **May 8, 1980**.

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## Chapter 28: Post-Eradication Operations

Once smallpox was eradicated, WHO implemented **post-eradication policies** to prevent future outbreaks. These included:

1. **Ending Routine Smallpox Vaccination** – By **1984**, all countries had discontinued mandatory smallpox vaccinations.
2. **Vaccine Stockpiling** – WHO and some governments **maintained emergency smallpox vaccine reserves** in case of bioterrorism or accidental reintroduction.
3. **Containment of Variola Virus Stocks** – Live smallpox virus was restricted to two labs:
  - **Centers for Disease Control (CDC) in the USA.**
  - **Vector Institute in Russia.**
  - All other **stocks were destroyed** to prevent unauthorized access.
4. **Surveillance of Monkeypox** – As monkeypox cases increased in **Zaire (now the Democratic Republic of Congo)**, WHO **launched a monitoring program** to ensure it would not become the next global threat.

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### Conclusion

The **final phase of smallpox eradication** required **strict verification, documentation, and containment policies** to prevent re-emergence. The success of the **global smallpox eradication program remains a landmark achievement**, proving that **infectious diseases can be eliminated through coordinated international effort**. WHO's **post-eradication policies** ensured that the world remains **prepared against future risks**, including **bioterrorism and emerging poxvirus threats**.