Immunization here and there, but not everywhere

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South Dakota Immunization Conference

29 April 2025

Outline . . . . . .

- Madagascar summary
- My role
- Immunization in Madagascar
- Measles here and there
- Immunization response to measles epidemic in Madagascar

South Dakota to Madagascar

10,000 miles

Madagascar summary

- Island 250 miles of East coast of Africa in Indian Ocean
- Size: 226,658 sq miles. Like Texas. 3-times South Dakota
- Population: 32 million. Asian and African mix
- Foods: Rice, corn, cassava, beans, tropical fruits, greens, fish, beef, chicken, pork
- Exports: Nickel, vanilla, cloves, gold, clothing
- Poverty: 64% live on less than $2.15 per day
- Economy: mostly subsistence farming, mining, tourism, corruption, satisfaction with status quo.

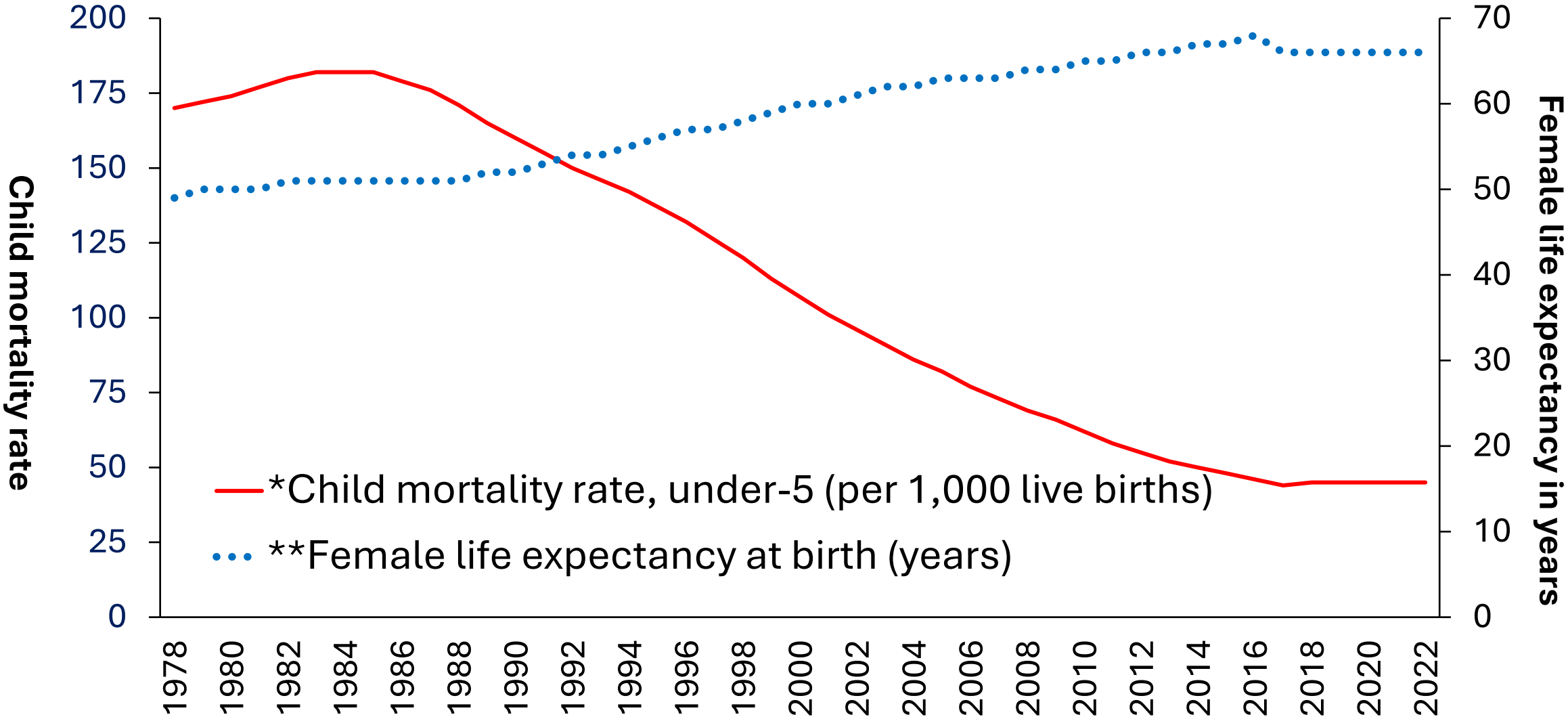
Top 10 causes of death Madagascar

1. Stroke
2. Diarrhea
3. Tuberculosis
4. Malaria
5. Heart disease
6. Lower respiratory infections (pneumonia)
7. Measles
8. Road accidents
9. Birth asphyxia and birth trauma
10. Preterm birth complications

Health threats that cross national borders . . . .

- Infectious diseases.
  - -- Avian influenza
  - -- Ebola
  - -- Covid
  - -- West Nile, Zika, Chikungunya, Dengue, Yellow Fever
  - -- HIV
  - -- Malaria
  - -- Polio
- Rapid international air travel.
- Climate change.
- Illegal drug trade.
- Air and water pollution.
- International migration and exploitation.
- Bio- or chemo- terrorism or weapons of mass destruction.

Child mortality rate* and female life expectancy**, Madagascar 1978 - 2022



My home for 2 years

CSB clinic
Ambohibary, Madagascar

28 June 2018

Nutrition Wall ,

7 food groups,

Ambohibary CSB Clinic,

Madagascar, 2018

Maternity room needed fixing

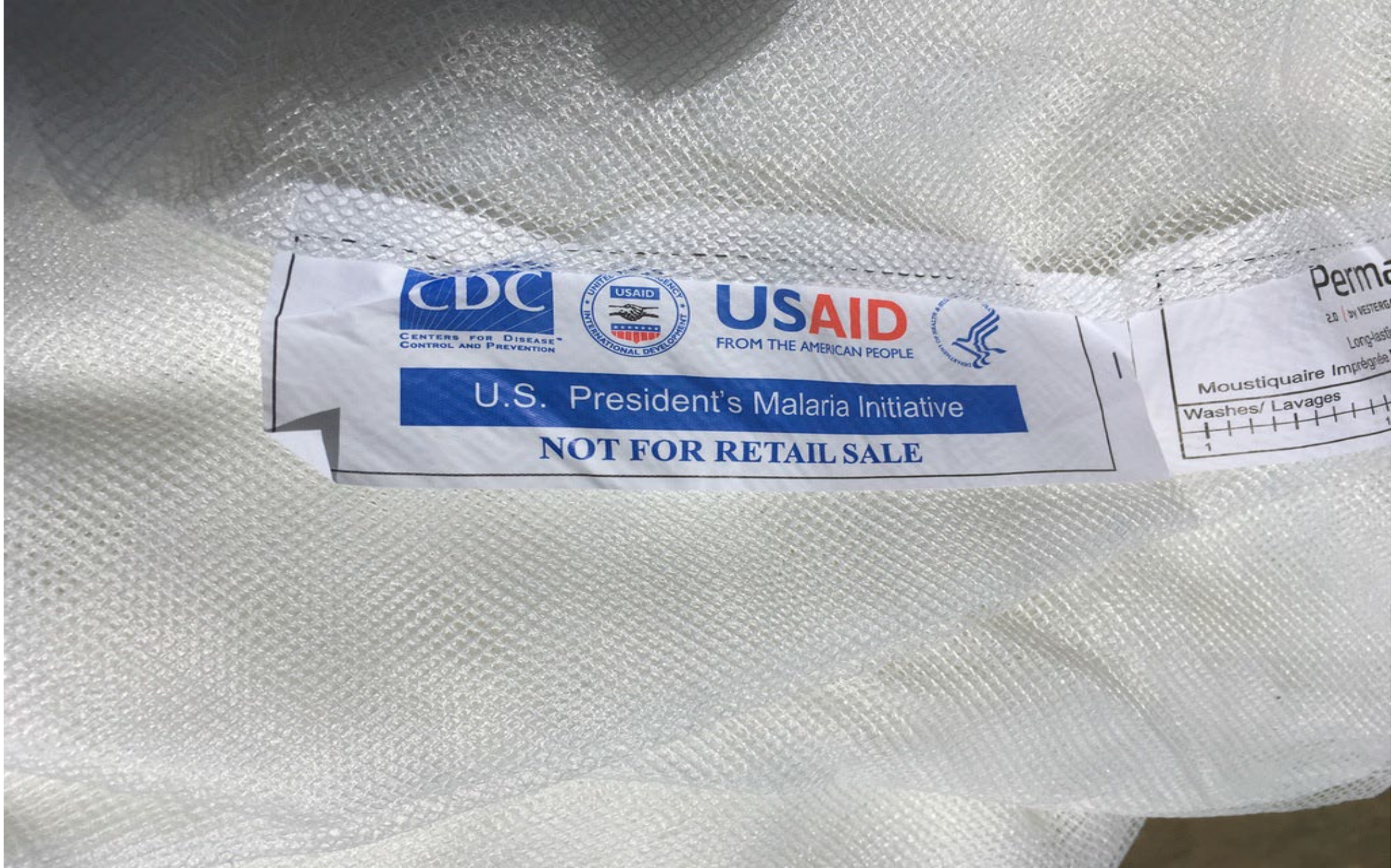
Ambohibary CSB Clinic, Madagascar, 2018

Maternity room upgrade,

Ambohibary CSB Clinic,

Madagascar, 2018

LAY
Fizarana maimaimpoana
Lay misy odimoka maharitra
TOROMARIKA


CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION
USAID
FROM THE AMERICAN PEOPLE
U.S. President's Malaria Initiative
NOT FOR RETAIL SALE
Moustiquaire Imprégnée
Washes/ Lavages

Water source, bucket drop well

Ambohibary Clinic,

Madagascar, pre-2019

Digging well,

Ambohibary Clinic,

Madagascar, 2019

Water tower,
Ambohibary Clinic,
Madagascar, 2019

Teaching about vaccine preventable disease,

Ambohimanatrika Madagascar

12 December 2019

Immunization coverage & under-5 mortality, South Dakota and Madagascar

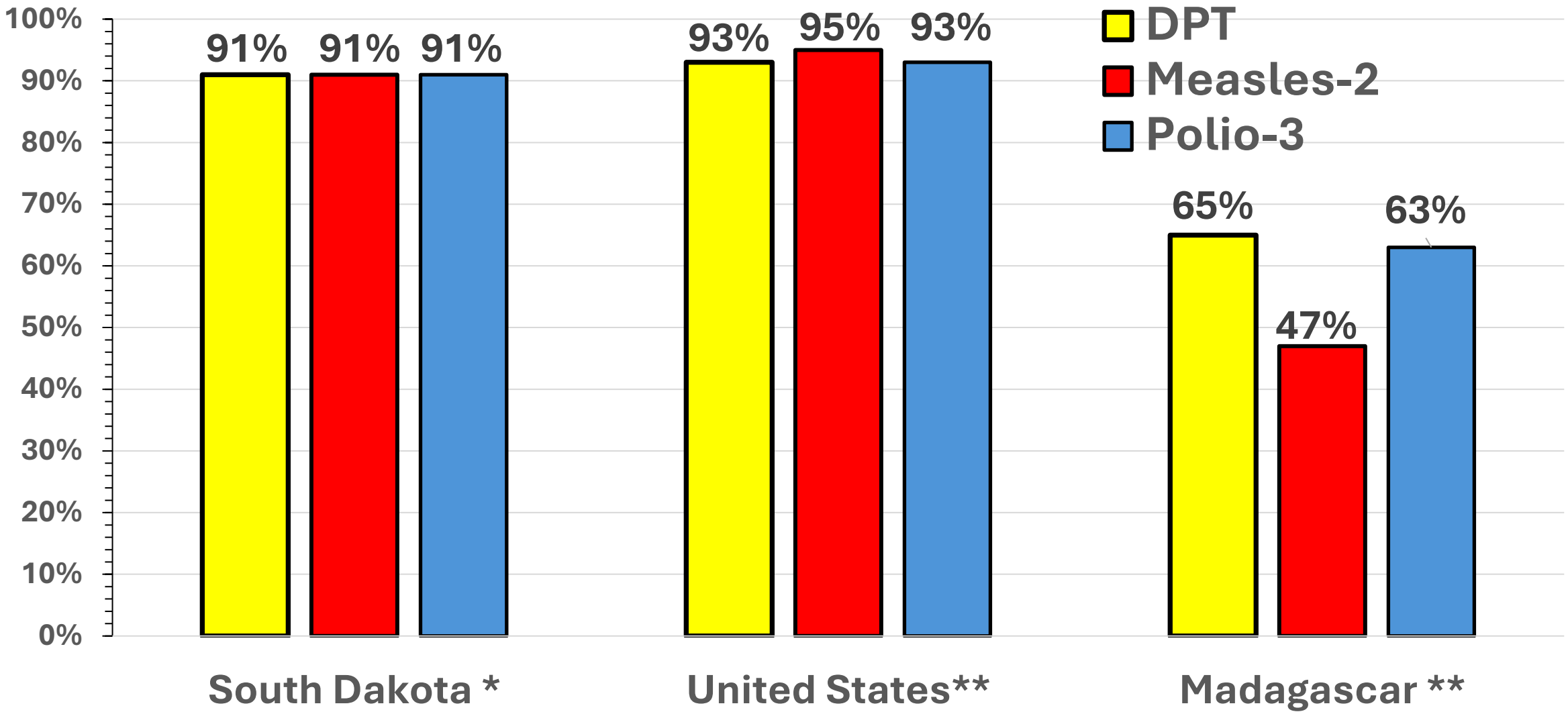
Country	DPT	Measles-2	Polio-3	Under-5 mortality rate (per 1,000)***
South Dakota *	91%	91%	91%	8.5
United States**	93%	95%	93%	6.5
Madagascar **	65%	47%	63%	64.8

*CDC. Coverage with Selected Vaccines and Exemption Rates Among Children in Kindergarten — United States, 2023–24 School Year. www.cdc.gov/mmwr/volumes/73/wr/mm7341a3.htm

**UNICEF. data.unicef.org/topic/child-health/immunization/

***UNICEF. data.unicef.org/topic/child-survival/under-five-mortality/

Immunization coverage, South Dakota and Madagascar



Postage Stamp promoting childhood vaccination, Madagascar

Child immunization schedule, Madagascar 2020

At birth: BCG and Polio oral-0

6 weeks: DPT1-HepB1-Hib1, PCV1, Rotavirus1 oral, Polio oral

10 weeks: DTC2-HepB2-Hib2, PCV10-2, ROTA2, Oral polio2

14 weeks: DTC3-HepB3-Hib3, PCV10-3, Oral Polio3, Injectable Polio

9 months: Measles*

*Second measles added after 2019 outbreak, 4 weeks after the first measles vaccine

Child immunization schedule, United States

At birth:	2 months	4 months	6 months	1 year	4 years
RSV	HepB[2]	DTaP[2]	DTaP[3]	HepB[3]	DTaP[4]
HepB[1]	DTaP[1]	Rotavirus[2]	Hib[2]	DTaP[4]	Polio[4], inject
	Rotavirus[1]	Hib[2]	PCV15,20[3]	Hib[3]	MMR[2]
	Hib[1]	PCV15,20[2]	Polio[3], inject	PCV15,20[4]	VAR[2]
	PCV15,20[1]	Polio[2], inject		Polio[3], inject	
	Polio[1], inject			MMR[1]	
				VAR[1]	
				HepA[1]	

Child immunization schedule, Madagascar 2020

At birth:	6 weeks	10 weeks	14 weeks	9 months
BCG	DPT^{1}-HepB^{1}-Hib^{1}	DPT^{2}-HepB^{2}-Hib^{2}	DPT^{3}-HepB^{3}-Hib^{3}	Measles*
Polio^{0}, oral	PCV10^{1}	PCV10^{2}	PCV10^{3}	
	Rotavirus^{1} oral	Rotavirus^{2} oral	Polio^{3}, oral	
	Polio^{1}, oral	Polio^{2}, oral	Polio, injection	

*Second measles added after 2019 outbreak

Pre-natal immunization schedule for mothers, Madagascar 2020

Tetanus: times 5

- **First**: at first prenatal visit
- **Second**: one month later
- **Third**: six weeks after the second
- **Fourth**: one year after the third
- **Fifth**: one year after the fourth.

Cold chain, Madagascar 2020

- Vaccine manufacturer
  - Funding: USAID, UNICEF, WHO, GAVI, EU, Rotary, Red Cross, Etc
    - National Ministry of Health
      - Regional Health Authority
        - District Health Office
          - Local Clinic
            - Village

Vaccination Day, Ambohibary, Madagascar

28 June 2018

Vaccination Day, Ambohibary, Madagascar

22 October 2018

Student Nurses Vaccination Day, Ambohibary, Madagascar

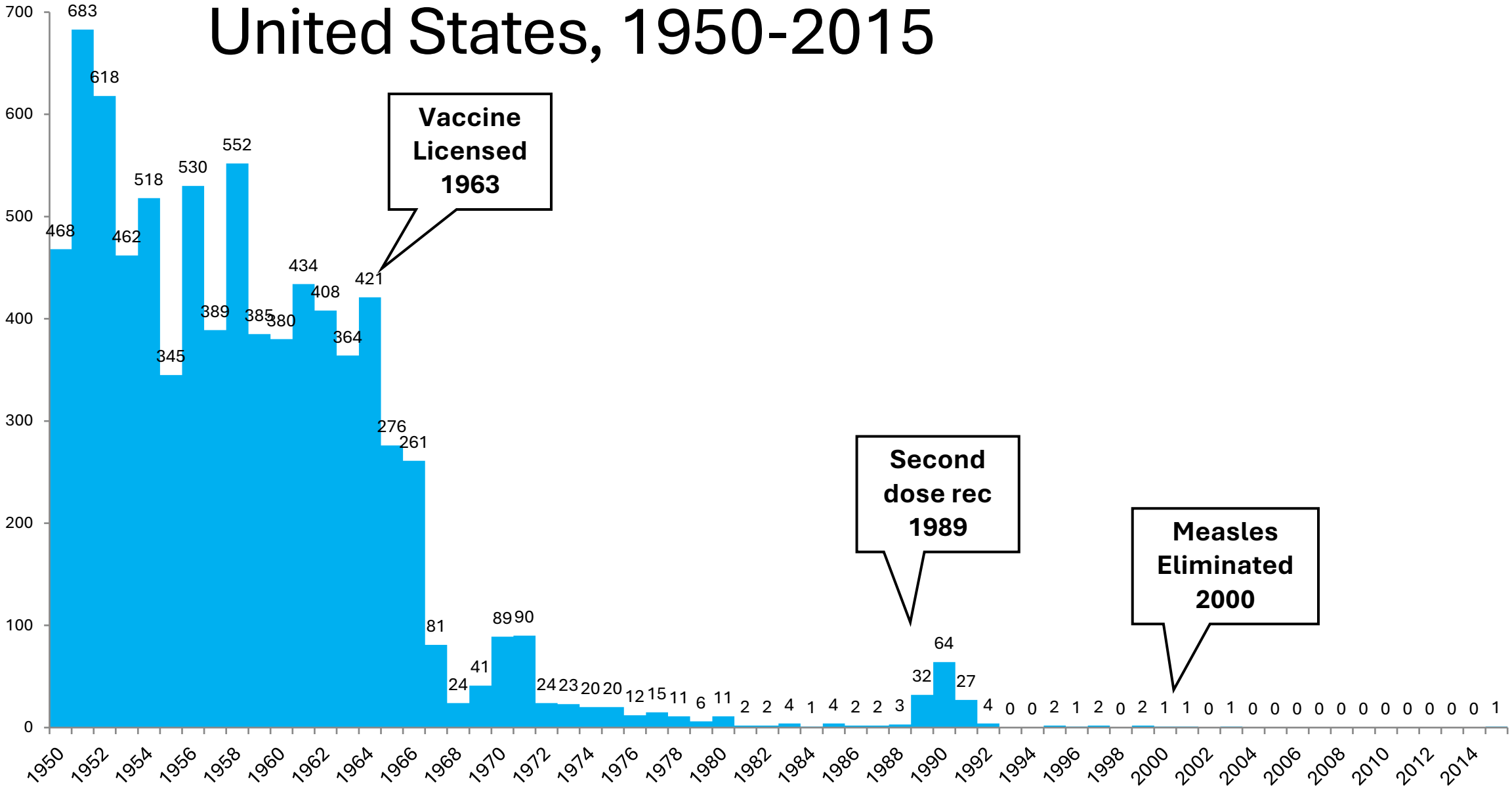
22 October 2018

SALAMA ny ZAZA VITA VAKSINY.

Delivering vaccines to outlying communities

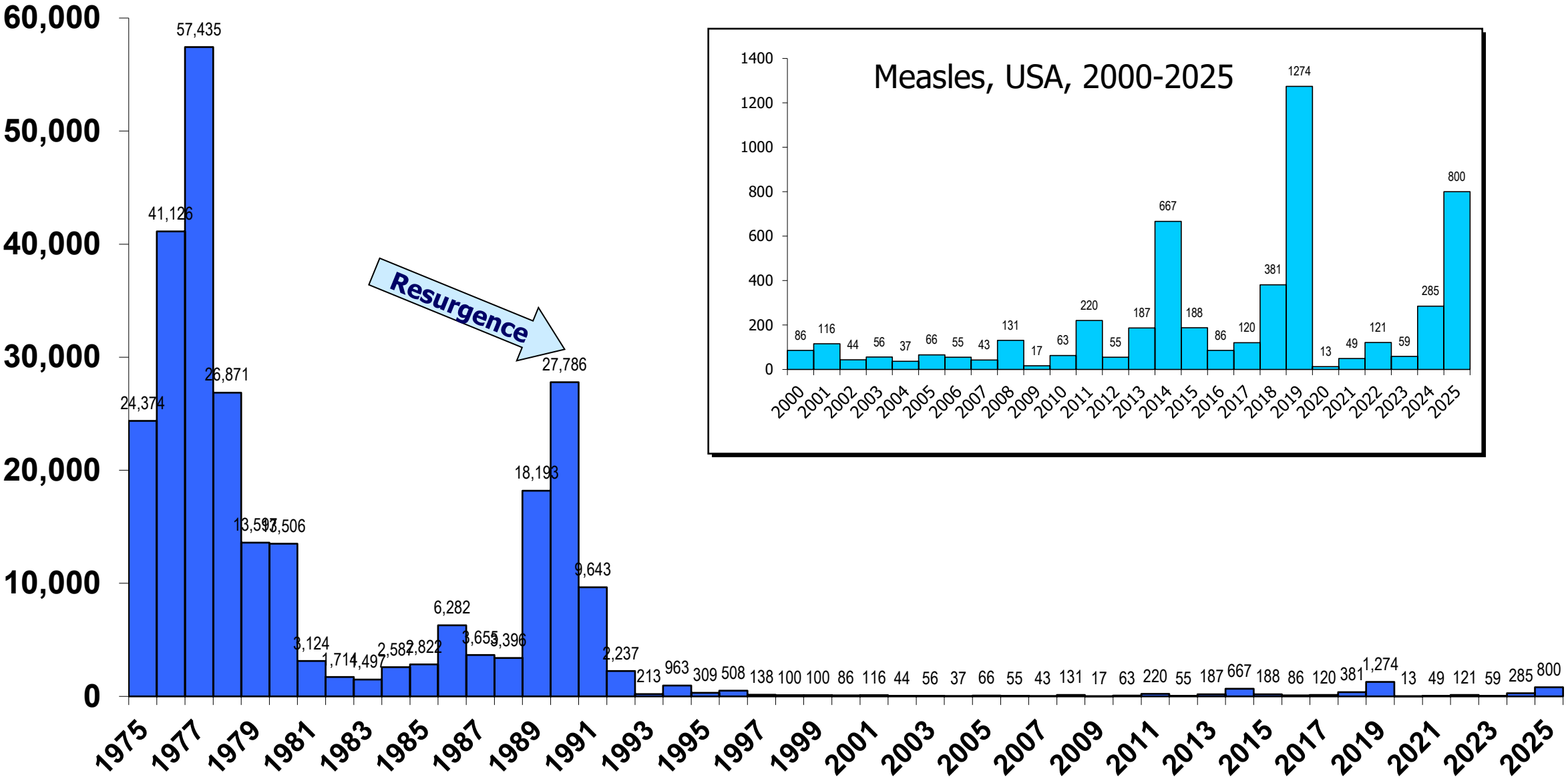
December 2019

Measles deaths, United States, 1950-2015

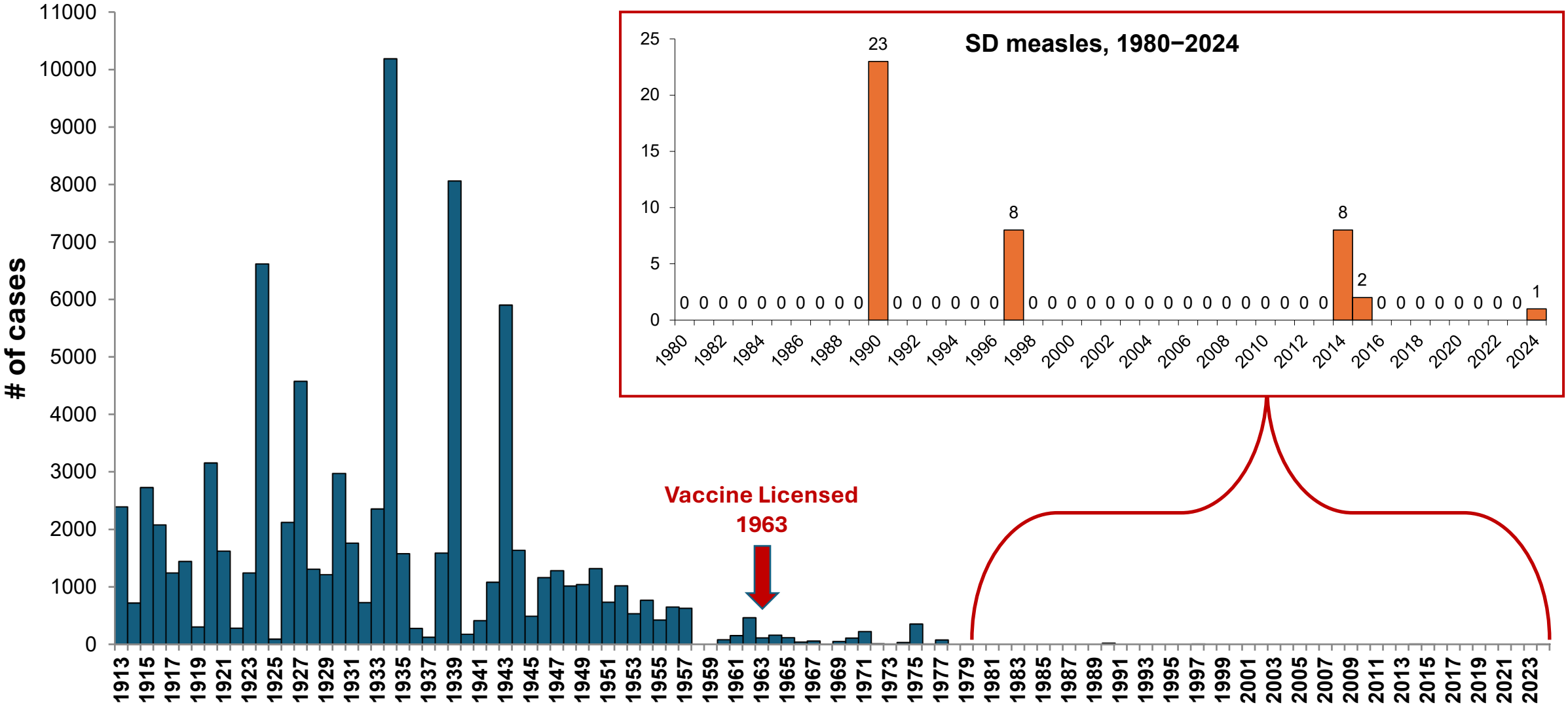


Source: CDC, Epidemiology and Prevention of Vaccine-Preventable Diseases, 13th ed, 2015

Measles cases reported, USA, 1975-2025 (as of 23 April 2025)



Measles Cases Reported, South Dakota, 1913–2024



Source: Dustin Ortbahn, SD-DOH

Recent measles outbreaks in South Dakota

- **1990 measles outbreak: University of South Dakota,** 23 cases.
- **1997 measles outbreak in Central South Dakota,** 8 cases.
  - 3 generations of transmission.
  - Counties: Hughes (3) and Hyde (5).
  - 7,678 people immunized in Pierre, Ft Pierre, and Highmore.
- **2014 - 15 measles outbreak, South Dakota,** 14 cases.

Dodging the viral bullet in South Dakota

- **2007:** Group of South Dakota students exposed to measles while attending science fair in Albuquerque. No cases.
- **2010**: Group of Sioux Falls school children exposed to measles while on Omaha field trip. No cases.
- **2011:** Measles outbreak in Minneapolis immigrant community exposed several South Dakota children. No cases.
- **2011:** North Dakota resident became sick with measles while staying in Rapid City motel and received care in local clinic. No secondary cases.
- **2016:** Refugee to Sioux Falls from Arizona Detention Center with measles outbreak. No cases.

We have been lucky, but it's not all luck. It is good primary prevention by maintaining high vaccination coverage.

Measles Epidemic, Madagascar 2018-2019

- **145,457 cases reported**
- **1,473 IgM positive**
- **1% deaths**

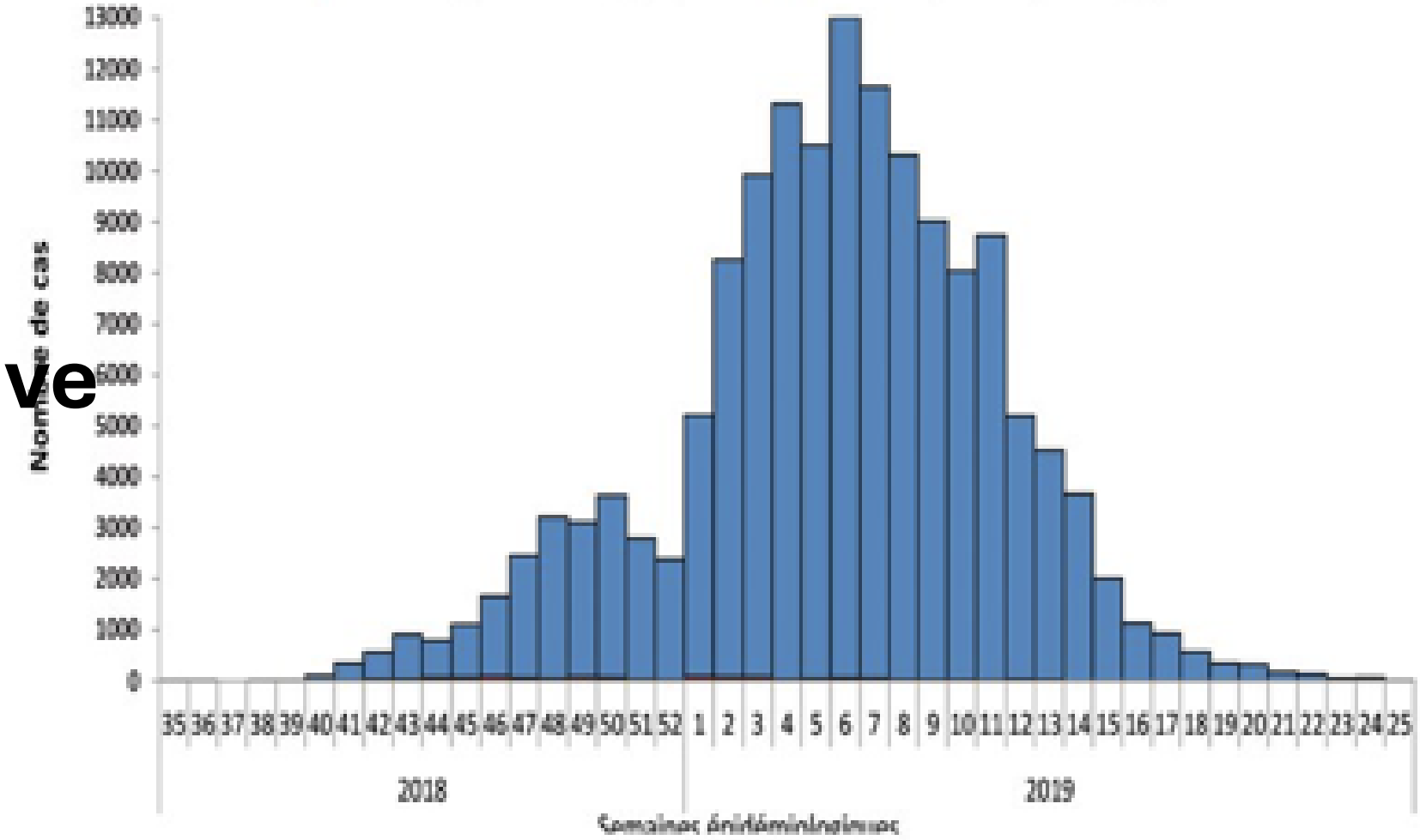
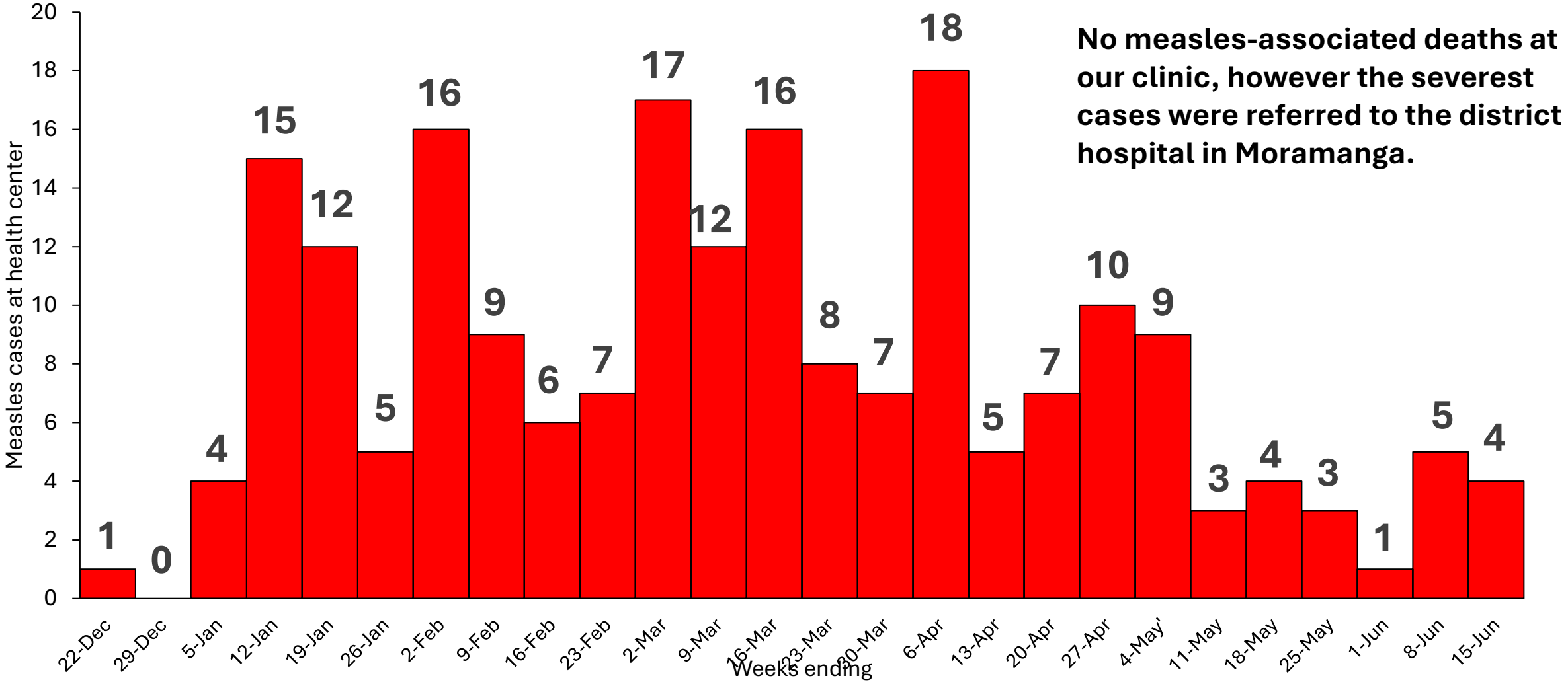


Figure 1 : Evolution hebdomadaire des cas confirmés (labo et lien épidémiologique) de rougeole, Madagascar, 03 septembre 2018 au 23 juin 2019

204 measles cases by week of presentation at health center, 20 Dec 2018 – 15 June 2019, Ambohibary, Moramanga, Madagascar.

(*Mass measles vaccination campaign, 14-18 January 2019)



No measles-associated deaths at our clinic, however the severest cases were referred to the district hospital in Moramanga.

Measles outbreak management: Ambohibary, Madagascar 2019

- Vitamin A, fever control and maintaining hydration,
- No laboratory confirmation,
- No formal case follow-ups,
- No determination of vaccination status,
- No patient isolation,
- No case finding,
- No contact tracking or quarantining,
- No school exclusions,
- Education by community health workers, clinic physician and nurses, and Peace Corps Volunteer, radio to increase awareness of measles outbreak and the necessity of vaccination prevention.
- Mass vaccination events.

Measles mass vaccination event, Ambohibary, Madagascar

14 January 2019

Measles mass vaccination event, Soavinaroana, Madagascar

15 January 2019

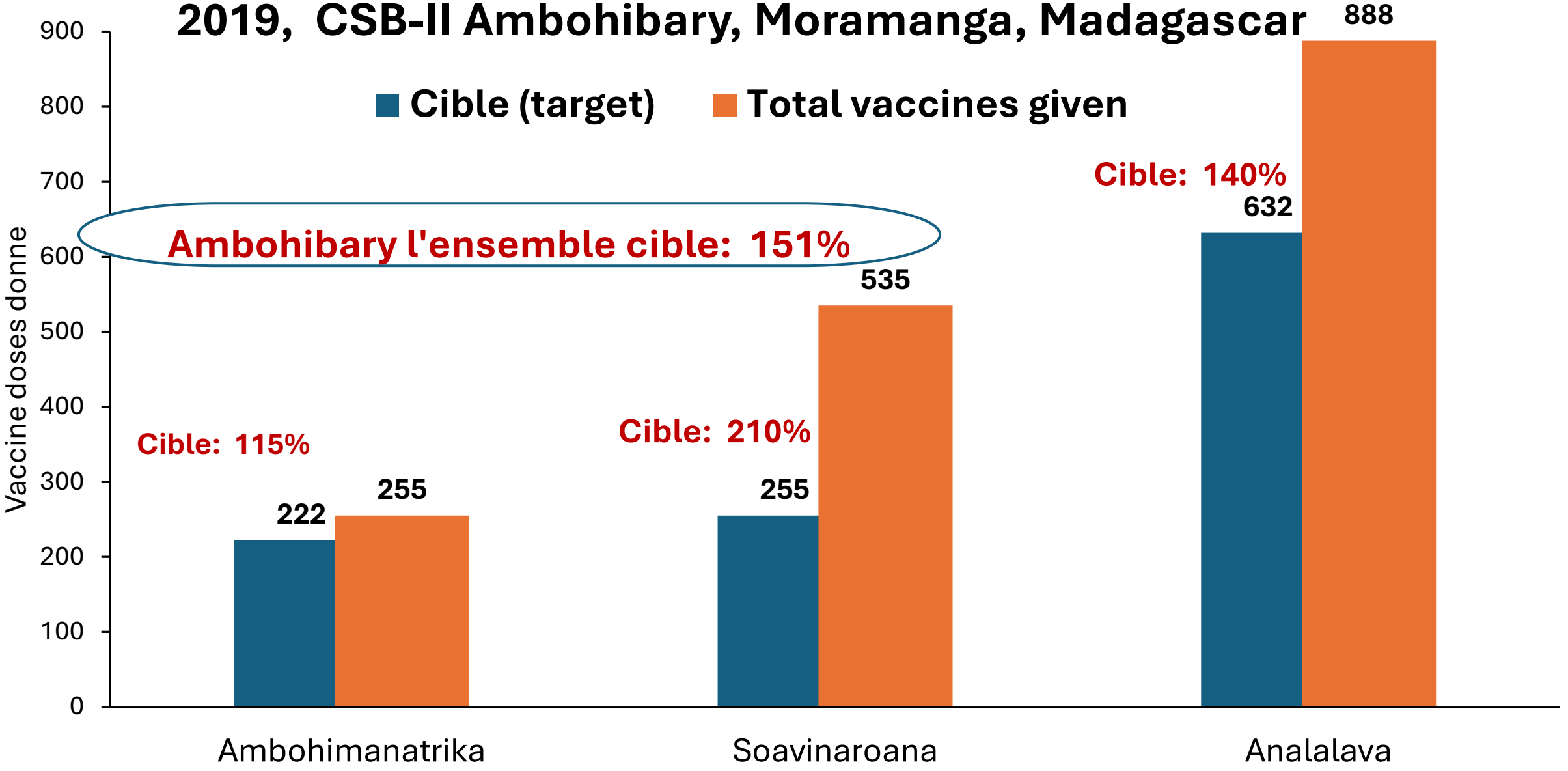
Measles mass vaccination event, Soavinaroana, Madagascar

15 January 2019

Measles mass vaccination event, Soavinaroana, Madagascar

15 January 2019

Campagne de riposte contre la rougeole: 14-18 Janvier 2019, CSB-II Ambohibary, Moramanga, Madagascar



Immunization here and there, but not everywhere

- Diseases are here and there, and can spread everywhere.
- Immunization protects me, you, family, school, community, state, nation, world.
- No “vaccine refusal” in Madagascar - - - however, inadequate resources and infrastructure.
- “Vaccines are safe and effective. High rates of immunization stop preventable diseases from spreading through our families, schools and communities.” **AAP**
- “Studies have repeatedly found no credible link between life-saving childhood vaccines and autism.” **AAP**

CANADA
UNITED STATES
RUSSIA
CHINA
INDIA
BRAZIL
AUSTRALIA
Antarctica
Thank you.