

## Medical News &amp; Perspectives

# Despite Safe and Effective Vaccine, Measles Cases and Deaths Increased Worldwide From 2021 to 2022

Rita Rubin, MA

It's been 60 years since the first measles vaccine was licensed for public use. The vaccine was derived from a strain named for the schoolboy whose throat swab successfully led to the virus' cultivation in the 1950s.

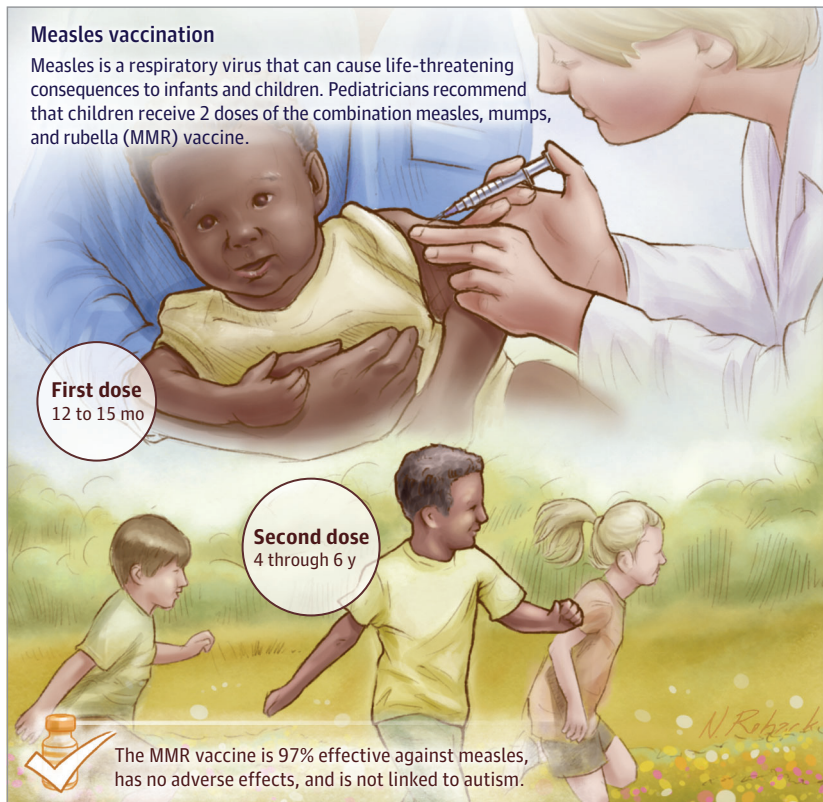
Yet, in 2022, more than 9 million measles cases occurred worldwide, and an estimated 136 200 people, mostly children, died from the highly contagious disease, according to a recent report from the US Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO). "It's very concerning because of how infectious this virus is and how dangerous it can be for children," Christopher Hsu, MD, PhD, the lead CDC coauthor of the report, noted in an interview.

According to the CDC, children younger than 5 years, adults older than 20 years, pregnant individuals, and people with compromised immune systems have the highest risk of measles complications, which can include encephalitis and pneumonia, the latter being the most common cause of death from measles in young children. In the US, about 1 in 5 people with measles who are unvaccinated require hospitalization.

Much progress toward eliminating measles had been made during 2000 to 2019, when the proportion of people globally who'd received at least 1 dose of measles-containing vaccine (MCV) increased from 72% to 86%. But during the COVID-19 pandemic, in 2021, worldwide coverage dropped to 81%, the lowest since 2008. It then rose to 83% in 2022, still not up to the prepandemic peak. In low-income countries, coverage fell from 71% to 67% in 2019-2021 and dropped another percentage point in 2022, the CDC and WHO found.

Although the US MCV coverage is more than 10 percentage points higher than the international average, it has slipped in recent years, Ericka McGowan, MPH, said in an interview. From 2019 to 2020, US coverage

was 95%, but from 2021 to 2022, it fell to 93%. It's usually 95% to 97% nationwide, noted McGowan, senior director of emerging infectious diseases at the Association of State and Territorial Health Officials.



Due to missed vaccinations, 2022 saw an 18% increase in estimated measles cases worldwide and a 43% increase in estimated deaths compared with the year prior, the report noted. This translated to about 1.4 million additional cases and 41 200 additional deaths.

The decline in measles vaccination rates likely is multifactorial, Hsu said. "Some of it may be the anti-vaccination sentiment," he acknowledged. "Every country is different." For example, he said, in some countries, delivery of vaccines to people living in remote areas might be challenging.

"What we want to emphasize is this is a call to action globally for all public health partners," including individual countries and non-government organizations, Hsu said of the report. "Measles has come back raging in resurgence. We have a highly effective and extremely safe vaccine that needs to be distributed to all children equitably to protect them."

Half the world's measles cases occurred in only 10 countries, which the CDC has prioritized, said Hsu, who oversees measles eradication for the WHO's Eastern Mediterranean Region and South-East Asia Region. "We offer expertise in how to prevent it, how to detect it," he explained. And virtually all measles deaths, mainly among children younger than 5 years, occur in low-income countries with weak health infrastructures, according to the WHO.

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the same shot as mumps and rubella vaccine (MMR) and, in some cases, varicella vaccine as well (MMRV). But in some countries, it is a stand-alone vaccine or one combined only with rubella (MR vaccine), Hsu said.

Although 6 of the WHO's 194 member countries introduced a second dose of MCV in 2022, bringing the total that have done so up to 188, that still leaves 6 countries where children receive only 1 dose. "Our ultimate goal globally is to offer at least 2 measles-rubella doses per child," Hsu said.

Although a single dose provides protection against measles, 2 doses are needed to protect against outbreaks, he explained. If more than 95% of children worldwide received 2 doses of MCV, Hsu said, "we can reduce the risk of outbreaks, and we can achieve elimination" of measles.

In countries with ongoing measles transmission and a high risk of measles mortality, the WHO [recommends](#) that MCV doses be given at 9 months and 15 to 18 months of age. In countries with low levels of transmission, where infants have a low risk of measles virus infection, the WHO recommends that the first dose be given at 12 months and the second at 15 to 18 months. In the US, the CDC [recommends](#) the first dose at ages 12 months to 15 months and the second at ages 4 years to 6 years, before school entry.

One approach to increasing MCV coverage might be to eliminate injections altogether. In November, Atlanta-based Micron Biomedical [received](#) a \$23.6 million grant from the Bill & Melinda Gates Foundation to fund mass production of the company's needle-free MR vaccines for low- and middle-income countries.

The vaccine is based on Micron's microarray technology, which minimizes or elimi-

nates the need for cold chain storage, [according to the company](#). Patients or their caregivers can apply the virtually pain-free microarray to the skin and then press a button on it to deliver the vaccine. At a [conference](#) in Seattle in May, Micron [presented](#) the results of a study, also funded by the Gates Foundation, that evaluated the safety, immunogenicity, and acceptability of an MR vaccine delivered with its microarray technology.

The study randomized adults, toddlers, and infants in The Gambia to receive the MR vaccine either by Micron's microarray or by subcutaneous injection. Microarray vaccination was found to be safe and well tolerated and induced similar immunogenicity to the injected vaccine in all 3 age cohorts.

### Measles Knows No Borders

A measles case anywhere in the world is a threat everywhere in the world, Hsu emphasized. "Just because this is happening overseas does not mean it's not a problem here," he said. "We all are connected globally."

In the past 30 years, the greatest number of measles cases reported in the US in a single year was 1274 in 2019, [according to](#) the CDC. Approximately 9 out of 10 of those cases occurred in people who weren't vaccinated; no deaths were reported.

The typical reasons why a child isn't vaccinated against measles in the US differ from those in low-income countries with the lowest coverage. In the US, "there's been an increase in nonmedical exemptions for vaccination for children," McGowan explained.

Every US state requires that children be immunized against measles and other childhood infectious diseases before they enter school, but medical exemptions are allowed. The MMR and MMRV vaccines are

made with weakened live virus, so vaccination could cause potentially life-threatening infections in children with seriously compromised immune systems, the CDC [notes](#).

But 45 states and the District of Columbia also grant religious exemptions for at least 1 childhood vaccine, and 15 states grant philosophical exemptions to parents who don't want their children vaccinated because of personal, moral, or other beliefs, [according to](#) the National Conference of State Legislatures. In 10 states, more than 5% of children have been exempted from getting vaccinated, McGowan said.

In 2023, 3 states enacted legislation that likely will increase the number of exempted children, she pointed out.

[Tennessee](#) removed the requirement that children who were home-schooled needed to receive the same vaccinations as children who attended schools. "It doesn't seem like a big deal, but home-schooled children and their parents still actually congregate," McGowan said.

In addition, [Montana](#), began requiring that schools inform parents and guardians about the availability of vaccine exemptions, and, similarly, [Idaho](#) began requiring that daycare facilities cite the state's immunization exemption law in communications with parents.

People in the US and other countries with few cases underestimate the severity of measles and other childhood illnesses, McGowan noted, "because they haven't seen them, they haven't seen what they do." ■

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