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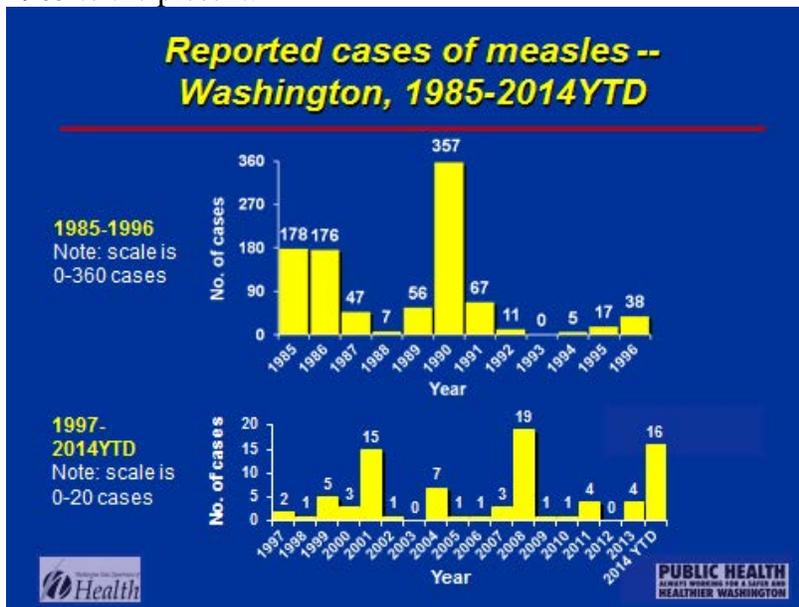
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Measles in Washington State – 2014

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Measles is an acute and serious viral rash illness that is highly contagious and was declared eliminated in the United States in 2000. However, though year-round endemic transmission no longer happens, measles cases still occur due to importation of measles by travelers arriving from countries where the disease remains endemic. Such imported cases then lead to secondary cases among susceptible persons, primarily those who are not vaccinated.

The graph below shows measles cases reported in Washington State from 1985 to the present:



Please note the different scale from 1985 to 1996. The outbreak from 1989-1991 was seen all across the United States and is often referred to as the “measles resurgence”. The recommendation for a second dose of measles, mumps, and rubella (MMR) vaccine was made after many resurgence measles cases were reported in school aged children that had already received 1 dose MMR vaccine.

During 2014, in Washington State and across the country, measles activity has been elevated, with 288 cases reported nationally – the most since elimination of endemic transmission was declared¹. Washington State

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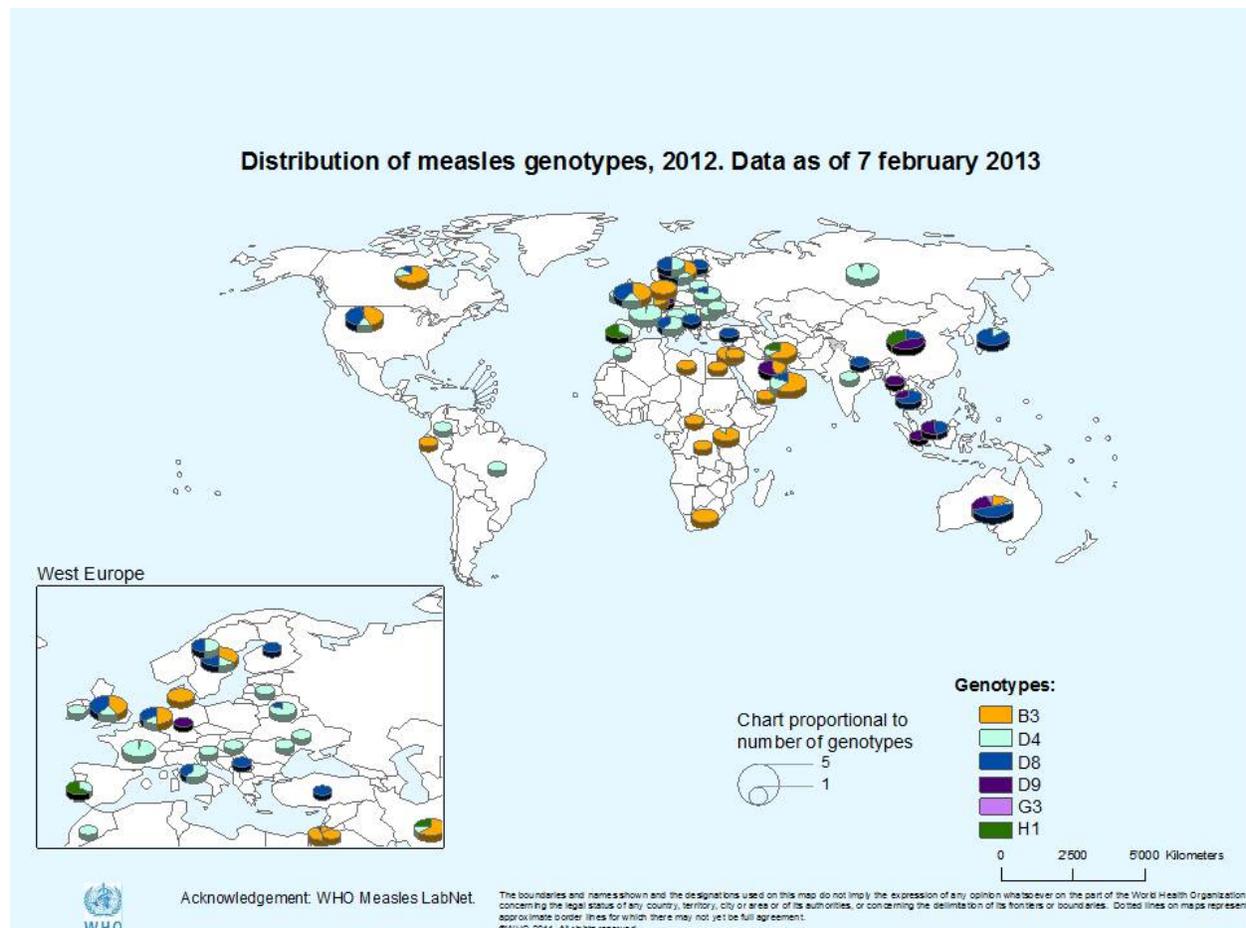
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usually receives from 0 to 5 reported measles cases per year. This year, a total of 16 measles cases in Washington residents were reported with rash onsets occurring between March 15 and May 30. Initial cases occurred mainly in San Juan and Whatcom County residents.

When measles is suspected it is important to obtain specimens for virus isolation, not only to confirm that measles virus is the cause of the illness, but also so that the virus that caused the illness can be genotyped to determine the strain. This helps us understand where measles is occurring in the world, and monitor patterns of spread of the virus as seen in this map from the [World Health Organization web site](#).



Genotyping results for the index cases in the San Juan and Whatcom clusters confirmed that two separate measles outbreaks were occurring simultaneously in Washington State and that the two clusters were due to different strains of measles. The six Whatcom County cases were due to a D8 strain of measles identical to the strain that, in an outbreak that began in May 2013, has caused 2,640 cases in the Netherlands with subsequent spread to the Fraser Valley in British Columbia, Canada where over 400 measles additional cases have occurred and where the unimmunized Whatcom County index case attends school and was exposed to measles.

Cases in the San Juan cluster began when the index case, an unimmunized adult resident of San Juan County, became ill after returning from travel to several countries in Southeast Asia with a final stop in the Philippines where over 32,000 cases (6,016 of them confirmed) and 41 measles deaths have been reported since the beginning of 2014. The San Juan County cluster, which

included six San Juan County residents and one Kitsap County resident, was caused by a B3 strain of measles virus, identical to the B3 that is circulating in the Philippines. All cases in each cluster could be epidemiologically linked back to the importation of measles by the index case from outside the United States.

Subsequently, three additional 2014 measles cases have been diagnosed in Washington residents. These cases were unrelated to either cluster or to each other. The first case was in a Skagit County toddler with an onset of wild measles 5 days after receiving an on-time dose of MMR vaccine. The child had no travel out of state and no known contact with a measles case, so the possibility of an adverse event following immunization was considered.

Nevertheless, measles control measures were implemented by the Skagit County Public Health Department, and further measles testing was conducted at the Centers for Disease Control and Prevention Measles Mumps Rubella and Polio Laboratory. Genotyping showed a B3 strain of measles virus that was different from the one that caused the San Juan outbreak. In fact, no other cases due to this particular strain have been documented in the United States, and it was most recently reported from cases in Iran in 2013. No exposure source for this case was identified.

An unimmunized teen resident of Snohomish County was exposed to measles while working in a crowded inner city environment in Indonesia with youth service mission group. When he became ill, he travelled back to the United States ahead of the rest of his group. Unfortunately, the teen's measles illness was severe enough during the return trip to cause collapse in the San Francisco airport and require ambulance transport to an emergency room, followed by a 3-day hospitalization in California. Genotyping showed that case was caused by a D8 strain of measles virus that is identical to a strain currently circulating in France.

Finally, a King County toddler that had never received an MMR (due to missed opportunity rather than a personal belief exemption) travelled with an aunt to the Micronesian island of Kosrae where a measles outbreak is currently occurring. According to a Federated States of Micronesia Department of Health and Social Affairs national epidemiologist, Kosrae has had 10 lab-confirmed and 89 suspect measles cases with onsets beginning in February 2014. After returning to King County the child developed a rash the following day. Genotyping information for this case is pending.

In summary, measles activity is markedly elevated so far in 2014, both in Washington State and nationally¹. Here in Washington, we have experienced two simultaneous measles outbreaks and three single measles cases with rash onsets for all cases occurring between

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March 15th and May 30th. Of the 16 cases, 11 (69%) were unimmunized, including the US residents that traveled abroad and returned home exposed or already ill, thereby importing measles. All four of these unimmunized travelers who imported measles into Washington State in 2014 should have received at least one dose of measles-containing vaccine according to recommendations from the Advisory Committee on Immunization Practices. Nine (82%) of the 11 unimmunized cases had not received vaccine due to personal belief exemptions. The other two were unimmunized due to missed opportunities. Four cases (25%) had an unknown immunization history, and one (6%) had received two doses of MMR vaccine.

1. Measles — United States, January 1–May 23, 2014. MMWR Weekly, June 6, 2014 / 63(22);496-499

The table below gives a summary of Washington State 2014 measles case characteristics, including vaccination status.

	County	Rash Onset	Age Category	Gender	Immunization Status	Reason not immunized	Source/Exposure	Lab confirmation
1	Whatcom #1	3/15	10-18	F	Unimmunized	Personal belief exemption	Goes to school in B.C.	D8 "Canada"
3	Whatcom #2	3/26	10-18	M	Unimmunized	Personal belief exemption	Sib in household of Whatcom #1	Epi linked
4	Whatcom #3	3/27	10-18	M	Unimmunized	Personal belief exemption	Sib in household of Whatcom #1	Epi linked
5	Whatcom #4	3/27	10-18	F	Unimmunized	Personal belief exemption	Sib in household of Whatcom #1	Epi linked
6	Whatcom #5	3/28	10-18	F	Unimmunized	Personal belief exemption	Sib in household of Whatcom #1	Epi linked
7	Whatcom #6	3/31	19-30	F	Unknown history		"Popped in" to Whatcom measles household on 3/18	D8 "Canada"
2	San Juan #1	3/25	19-30	M	Unimmunized	Personal belief exemption	Travel to SE Asia and Philippines	B3 "Philippines"
8	San Juan #2	4/3	1-4	M	Unimmunized	Personal belief exemption	Nephew & household member of San Juan #1	B3 "Philippines"
9	San Juan #3	4/4	19-30	M	Unimmunized	Personal belief exemption	Sibling & household member of San Juan #1	B3 "Philippines"
10	San Juan #4	4/4	19-30	M	Unknown history		Co-worker & personal friend of San Juan #1	B3 "Philippines"
11	San Juan #5	4/8	19-30	M	MMR x 2	Dose 1 was given in outside US. Dose 2 given in another state	Co-worker & provided transportation for San Juan #1	B3 "Philippines"
12	San Juan #6	4/8	31-57	F	Unknown history	Parent thinks case was immunized Dose may have been given outside US.	Goes to XX's Market almost daily ~4:30 – 5:30pm. San Juan #1 was there on 3/24 2-5:30pm.	B3 "Philippines"
13	San Juan #7 (Kitsap)	4/9	31-57	M	Unknown history		Working in San Juan county. Ate at restaurant while San Juan #1 was present and contagious on both 3/21 & 3/24	B3 "Philippines"
14	Skagit #1	4/9	1-4	F	Unimmunized	Dose given on time, but only 5 days before onset	Unknown	B3 "Iran"
15	Snohomish #1	5/17	19-30	M	Unimmunized	Personal belief exemption	Travel to Indonesia	D8 "France"
16	King #1	5/30	1-4	M	Unimmunized	Missed opportunity	Travel to Micronesia (Kosrae)	Yes-pending