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Role of laboratory on Measles and Rubella elimination program in Iran

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History of Measles Elimination in Iran

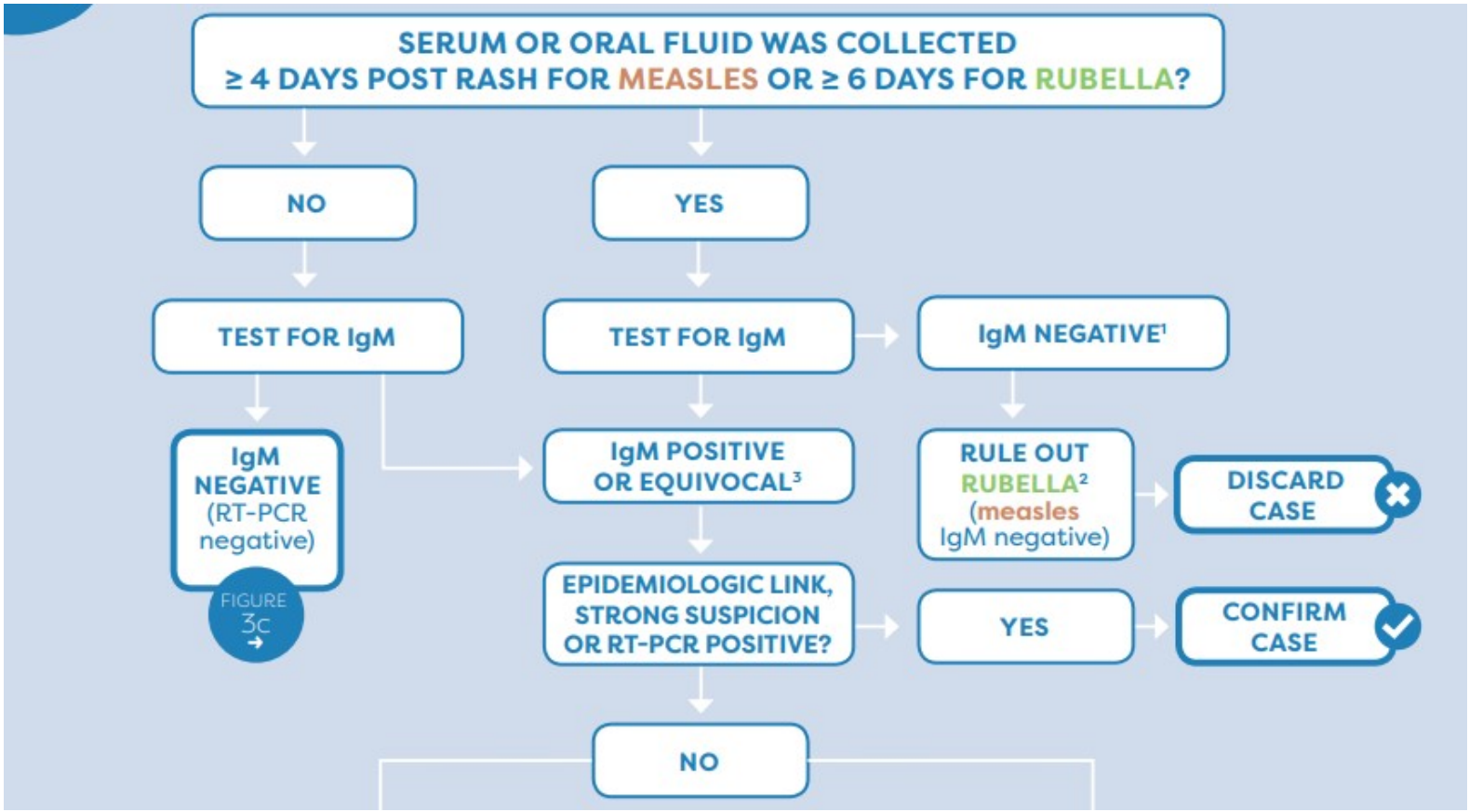
- The first use of Measles vaccine was in 1968
- The measles vaccine has been used twice at 9 and 15 months of age since 1984.
- In 2003, catch up SIA by Measles and Rubella vaccine conducted for the age group of 5 to 25 years.
- Since 2004, the MMR vaccine has been used at 12 and 18 months of age.
- As of 2014 all non-pregnant married women are being screened at their first visit to health system for review of their immunity against rubella, and non-immune women are immunized by MR vaccine.
- Iran has been verified as measles eliminated country in October 2018.

Bahrain and Oman verified as measles and rubella eliminated in 2018, Egypt verified in 2022.

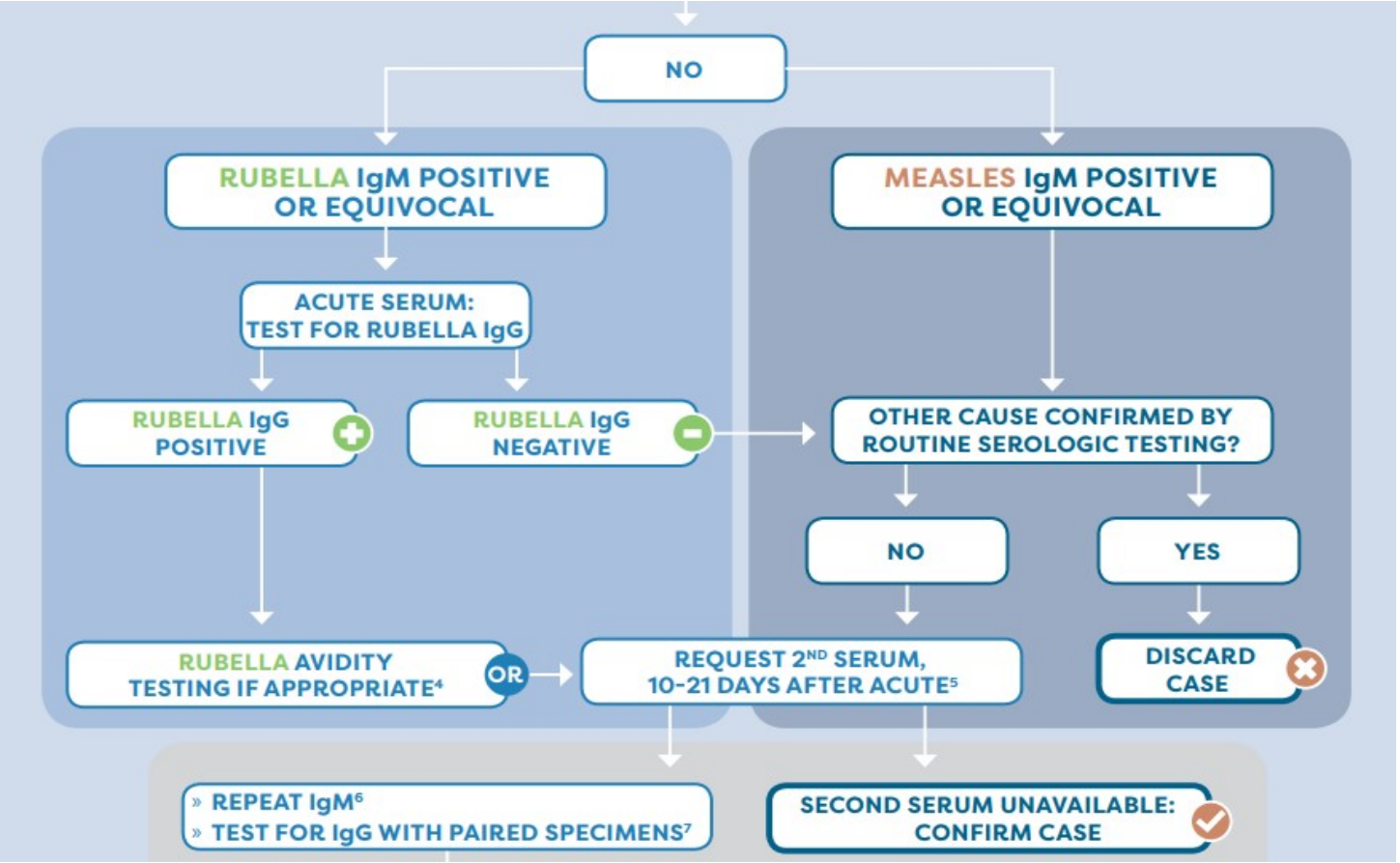
Definition of measles elimination

- **Suspected case definition for case finding**
  - A suspected case is one in which a patient with fever and maculopapular (non-vesicular) rash, or in whom a health-care worker suspects measles.
- **Definition of measles elimination**
  - the absence of endemic measles transmission in a defined geographical area (a country or a region) for 12 months in the presence of a well performing surveillance system
  - Note: verification of measles elimination takes place after 36 months of interrupted endemic measles virus transmission
- **Endemic measles case**
  - Confirmed case of measles resulting from endemic transmission of measles. Endemic transmission is defined as a chain of measles virus transmission that is continuous for ≥ 12 months within a country.

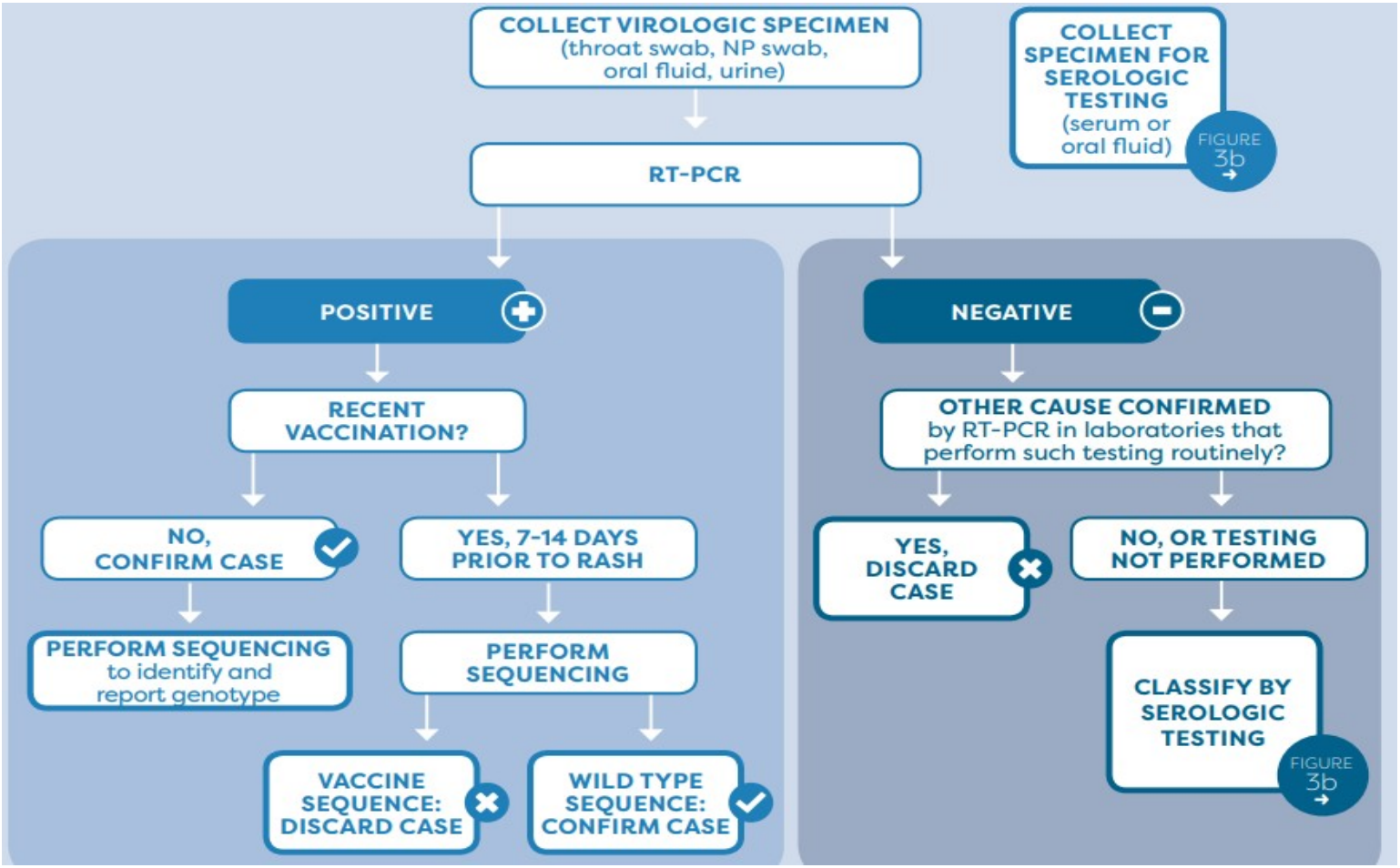
Laboratory testing for measles or rubella suspected case-1



Laboratory testing for measles or rubella suspected case-2



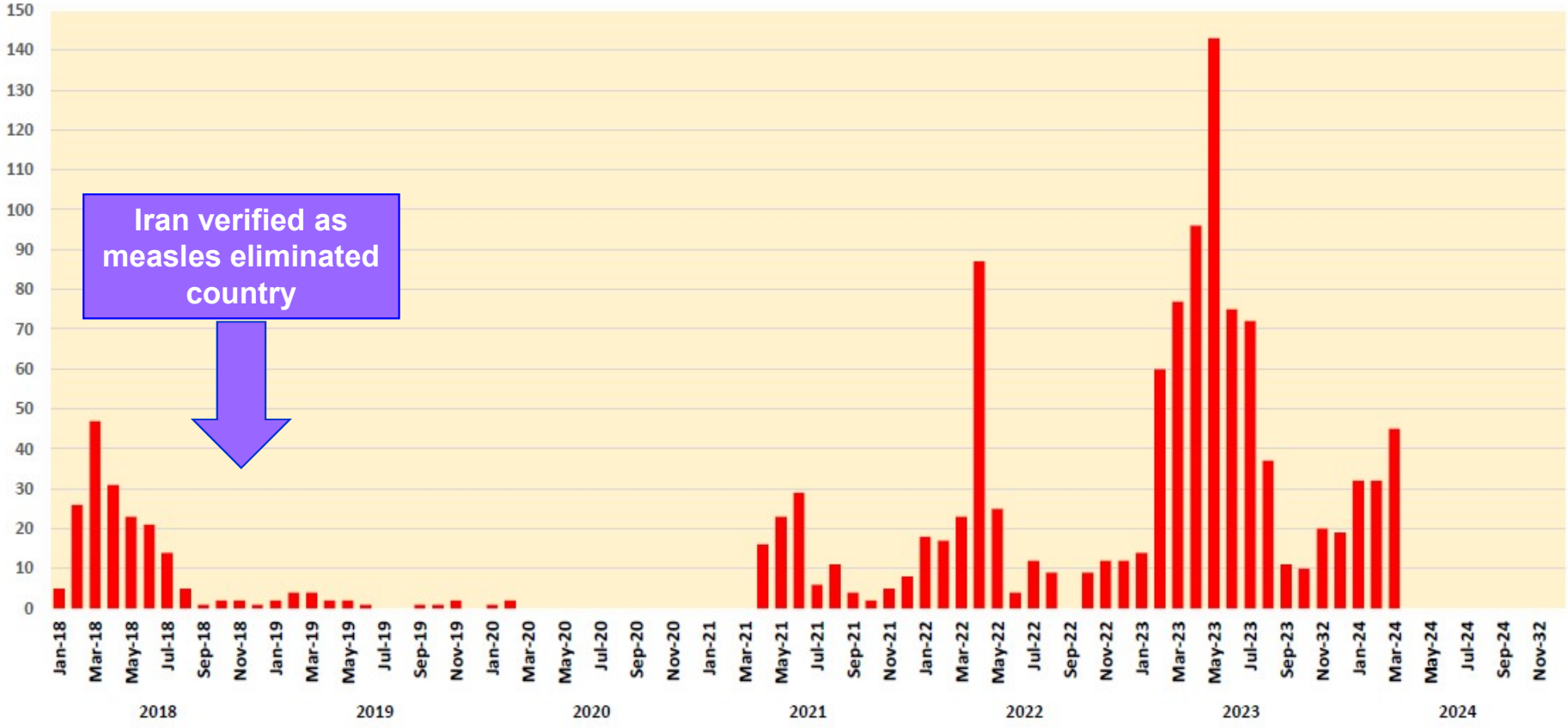
Laboratory testing for measles or rubella suspected case,3



Measles Epidemiology

Iran, 2020-22

Trend of measles confirmed cases in Iran, 2018-2024 (as of March)



Measles	2020	2021	2022	2023
Total suspected cases	2596	4183	10619	7979
Total confirmed cases	3	103	231	648
Total discarded	2593	4080	10388	7331
Pending classification	0	0	0	0
Total deaths related to measles	0	3	0	3
Total incidence of cases/million population	0	1.2	2.8	7.3
Incidence of indigenous cases/million population	0	0	0	0
DSID/Genotype(s)	-	B3	B3	B3,D8

Measles cases by final classification and source of infection at national level, 2022

Source of infection	Laboratory-confirmed	Epidemiologically linked	Clinically compatible	Total
Endemic	0	0	0	0
Unknown	19	0	0	19
Imported	34	0	0	34
Import-related	174	1	3	178
Total	227	1	3	231

Measles Cases With Genotype and Distinct Sequence ID (2018-2021)

Distinc Seq ID	2018												2019												2020												2021											
	Month												Month												Month												Month											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
MVs/Kabul.AFG/20.2014/3.4298 [B3]				2									2	1	1																																	
MVs/Dublin.IRL/8.16/1/With Distinct Seq ID 4306 [B3]																																																
MVs/Islamabad.PAK/1.13/1.4194 [B3]	1	14	26	3	2	7	9																																	6	6	4	2	2					
MVs/Tonbridge.GBR/5.14/1/ With Distinct Seq ID 4780 [B3]																																															
B3 variant with distinct seq ID 1310			1					2																																							
B3 variant with distinct seq ID 4518		1	2	1																																										
B3 variant with distinct seq ID 5460			1																																											
B3 variant with distinct seq ID 5461			1																																										
B3 variant with distinct seq ID 5463			1																																										
B3 variant with distinct seq ID 5464					1						1	1						1																													
B3 variant with distinct seq ID 5465				2																																										
B3 variant with distinct seq ID 5467					2																																									
B3 variant with distinct seq ID 5640				1																																									
B3 variant with distinct seq ID 5704			1																																										
B3 variant with distinct seq ID 5705			1																																										
B3 variant with distinct seq ID 5707			2																																										
D8 variant with distinct seq ID2266																						1	1																							
MVs/Bradford.GBR/13.18/5258[B3]																																													2	1
MVs/Oslo.Nor/16.18/5287[B3]																																													1

Distinc ID	Distinc Seq ID	2022												2023											
		Month												Month											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
5704	MVs/Alborz.IRN/18.23																	1							
6418	MVs/Quetta.PAK/44.20	7	4	10	8	9	1						1		2	1	6	6	3	3					
6482	MVs/Virginia.USA/36.21/4			2	1																				
6495	MVs/Baghlan.AFG/2.22	3																							
8257	MVs/Hormozgan.IRN/52.21/2	1																							
8258	MVs/Tehran.IRN/52.21/3	1																							
8259	MVs/Sirjan.IRN/2.22/3	2																							
8260	MVs/Ardebil.IRN/3.22/3	1																							
8261	MVs/Sirjan.IRN/2.22/3				1																				
8262	MVs/Tehran.IRN/6.22/3				1																				
8265	MVs/Yazd.IRN/9.22			1																					
8263	MVs/Kabul.AFG/1.22/2			3	1	1																			
8264	MVs/Tehran.IRN/11.22			1																					
8267	MVs/Yazd.IRN/9.22/5			2																					
8268	MVs/Tehran.IRN/12.22/3			1	1																				
8269	MVs/Bushehr.IRN/13.22			1	11																				
8274	MVs/Karaj.IRN/13.22/3				1																				
8275	MVi/Savojbolagh.IRN/14.22				1																				
8276	MVi/Tehran.IRN/14.22/2				1																				
8279	MVs/Kandahar.AFG/2.22/2				1																				
8280	MVs/Kelardasht.IRN/14.22/13				3																				
8281	MVs/Bushehr.IRN/14.22/17				2																				
8282	MVs/Bushehr.IRN/13.22				1	2																			
8283	MVs/Mashhad.IRN/16.22/2				2																				
8284	MVs/Tehran.IRN/16.22/3				1																				
8285	MVs/Bandarabbas.IRN/16.22/4				1																				
8286	MVs/Arsanjan.IRN/16.22/5				1																				
8298	MVs/Chabahar.IRN/17.22/3					1																			
8289	MVs/Kerman.IRN/18.22					1																			
4194	MVs/Islamabad.PAK/1.13						1																		
8395	MVs/Chabahar.IRN/45.22											6	5	4	13	3	10	6	3						
8396	MVs/Yazd.IRN/50.22												1												
8406	MVs/Iranshahr.IRN/50.22												1		4	1	2		1						
8408	MVs/Karaj.IRN/51.22												1												
8409	MVs/Yazd.IRN/52.22												1												
8444	MVs/Iranshahr.IRN/8.23/4														1										
8537	MVs/Zahedan.IRN/21.23																	1	4	3					
8548	MVs/Kerman.IRN/27.23/3																			1					

Measles outbreaks in Iran, 2020-2022

Year	Number of outbreaks based on number of affected people			
	Sporadic	2-4	5-9	10 and more
2020	1	1	0	0
2021	4	5	5	4
2022	25	7	12	9

- The highest number of people affected by one outbreak were 18 and 25 in 2021 and 2022, respectively.
- In 2021 and 2022, 10 and 34 virus strains with specific DSID caused outbreaks, respectively.

Measles surveillance indicators

Iran, 2020-22

Laboratory	Target	2020	2021	2022
Proportion of suspected cases with adequate specimen collection for detecting acute measles and rubella infection collected and tested in a proficient laboratory	≥80%	98	98.3	97
Proportion of laboratory-confirmed chains of transmission (defined as one or more confirmed measles cases) with specimens adequate for detecting measles virus collected and tested in an accredited laboratory	≥80%	100	100	100
Proportion of serology results reported to national public health authorities by the laboratory within 4 days of specimen receipt	≥80%	97.4	95.4	90

Way Forward

- Maintaining high immunization coverage (>95%) with 2 doses of MMR vaccine at all districts.
- Considering high risk areas/groups to prevent immunity gap.
- Continuation of the use of the zero dose of measles vaccine in children under 12 months of age, especially in the provinces with the highest risk of exposure to the disease
- Maintaining standard surveillance system at district level to minimize cases with unknown source.
- Strengthening molecular epidemiology in outbreak investigation.

Thank you

Measles/rubella	Target	2020	2021	2022
Epidemiological/case report				
Proportion of surveillance units reporting measles and rubella data to the national level (completeness); large countries should report on third administrative level as well	≥80%	98	98.3	98
Proportion of surveillance units reporting measles and rubella data to the national level on time (timeliness)	≥80%	98	98	98
Reporting rate of discarded non-measles non-rubella cases at national level	≥2 /100 000	3.2	4.8	12.3
Proportion of second administrative level units (province, governorate etc.) reporting at least two discarded non-measles non-rubella case per 100 000 population	≥80%	81	89	98.4
Reporting on third administrative level in large countries	≥80%	70*	78	98
Proportion of suspected measles and rubella cases with adequate investigation initiated within 48 hours of notification	≥80%	96	97	97
Proportion of specimens received at the laboratory within 5 days of collection	≥80%	93	80	85

*Mainly districts with less than 50000 population had no reported case