

المعهد الوطني الفلسطيني للصحة العامة
The Palestinian National Institute of Public Health

Vaccine-preventable diseases

in Palestine

monitoring, prevention and recommendations

A technical review



Table of Contents

Summary	4
Introduction	5
Methodology	5
Description of the EPI	6
Immunisations	6
Reported communicable diseases	7
Diseases	9
Tuberculosis	9
Hepatitis B	10
Poliomyelitis	12
Diphtheria	13
Pertussis	14
Tetanus	15
Haemophilus influenzae type B disease, invasive (meningitis and septicaemia)	16
Pneumococcal disease, invasive (meningitis and septicaemia)	17
Measles	18
Mumps	19
Rubella	20
Vaccine-preventable diseases surveyed, but not in the EPI	22
Meningococcal disease	22
Discussion	23
Surveillance systems	23
Disease and prevention	26
Conclusions	28
Recommendations	29
Surveillance systems	29
Disease and prevention	29
References	31





Summary

Introduction: The surveillance system for communicable diseases and vaccinations in Palestine is robust and well established. The burden of vaccine-preventable disease in Palestine is low for most vaccine-preventable diseases.

Methods and findings: Data on the reported number of vaccinations given and the reported number of vaccine-preventable diseases were collected from the MoH, analysed and discussed.

Vaccination coverage is very high for all EPI vaccines. The reported number of cases of vaccine-preventable diseases is low for most diseases with the exception of chronic hepatitis B, pertussis and mumps. However, the meningococcal disease situation in the Gaza Strip raises concern.

Discussion and conclusions: Although the situation of vaccine-preventable communicable diseases and their surveillance in general is of high standard, there is always room for considerable improvements.

Recommendations:

- Improve the denominator data used for measuring vaccine coverage
- Assess the currently reported low rates of tuberculosis
- Synchronise reporting between West Bank and Gaza, including for hepatitis B, pertussis, mumps and meningococcal disease
- Ensure lab testing for all diseases in the EPI programme, including for pertussis and mumps in Gaza and West Bank
- Consider reorganising reporting of invasive bacterial infections (meningococci, pneumococci and Hib) to include both meningitis and septicemia
- Improve lab diagnostic possibilities for meningococci in Gaza
- Consider increased surveillance and prevention measures against polio.
- Consider whether to introduce booster doses of certain vaccines to older children and adults, most notably against pertussis, but also against tetanus and polio.

Note:

This technical review was finalised in August 2013. Since then there has been substantial developments in certain areas, especially regarding poliomyelitis. These developments are not included in this review.

Introduction

Vaccines are among the most successful preventive measures against disease in the history of public health. The Expanded Programme on Immunisation (EPI) was established in 1974 to build on the success of the global smallpox eradication programme, and to ensure that all children in all countries benefited from life-saving vaccines.

To measure the effect of the EPI it is important to have a good monitoring and surveillance system both for the usage of vaccines and for the occurrence of the communicable diseases in the population.

Palestine has a comprehensive childhood vaccination programme and some of the highest vaccination coverage rates in the world. The communicable disease surveillance system is well based and documented and produces reliable figures of the incidence of disease. However, no system is perfect, and there is always room for.

The aim of this paper is to present the reported national figures of vaccine-preventable communicable diseases, the vaccination figures, and to discuss and suggest possible further improvements.

Methodology

Data on the reported number of vaccinations given and the reported number of vaccine-preventable diseases were collected from the Palestinian Health Information Center (PHIC). The data was analysed and discussed, and possible improvements presented.

First a short description of the EPI is given together with an overview of the reported vaccine-preventable diseases. Then a more in depth description of each disease is given together with an assessment of the situation for the disease and for the surveillance of it. Finally conclusions and recommendations are provided.



Description of the EPI

The childhood immunisation programme for Palestine is in accordance with the recommendations from WHO. All children in Palestine are offered the recommended vaccine doses free of charge.

Table 1. Immunisation schedule for Palestine (Last alteration was in July 2012)

Age	Vaccine against	Vaccine
Birth	Tuberculosis, hepatitis B	BCG, Hep B
1 month	Poliomyelitis	IPV
2 months	Poliomyelitis, diphtheria, pertussis, tetanus, Haemophilus influenzae type B infection, hepatitis B, pneumococcal disease	(IPV) OPV1, DTP+Hib+HepB1, Pneumovax1
4 months	Polio, diphtheria, pertussis, tetanus, Hib infection, Hep B, pneumococcal disease	OPV2, DTP+Hib+Hep B2, Pneumovax2
6 months	Polio, diphtheria, pertussis, tetanus, Hib infection, Hep B	OPV3, DTP+Hib+Hep B3,
12 months	Pneumococcal disease, measles, mumps, rubella	Pneumovax3, MMR1
18 months	Polio, measles, mumps, rubella, diphtheria, pertussis, tetanus	OPV4, MMR2, DTP
6 years	Polio, diphtheria, tetanus	OPV5DT
15 years	Tetanus, diphtheria	dT

Immunisations

Each health care facility that provides vaccination in the EPI programme counts the number of doses given for each of the vaccines and reports monthly to the District Primary Health Care Directorate (DPHCD). The data will be available for the Preventive Medicine Department at MoH who performs the analysis.

- The numerator is the number of vaccines given for each of the vaccine doses in the programme (for example OPV 1, OPV 2, and OPV 3 separately) in each district.
- The denominator is the number of children registered in each district according to the national population statistics at the different ages.

Vaccination coverage may exceed 100% for some vaccines in some districts and years. The reason can be that not all children are registered in the population register as well as some children being vaccinated in a different district from where they are registered. Parents visiting from other countries or from East Jerusalem may also bring their children for vaccination when they are visiting a Palestinian clinic in the West Bank or the Gaza Strip.

Table 2. Vaccine coverage in Palestine 2012. Numbers of vaccines given and the vaccination rate as the percentage of children registered by region

Vaccine	West Bank		Gaza Strip		Palestine	
	Numbers	%	Numbers	%	Numbers	%
BCG	66,097	98.0	57,415	98.0	123,512	98.0
Hep B1	62,101	92.1	57,415	98.0	119,516	94.8
OPV1	64,876	96.2	57,692	98.5	122,568	97.3
OPV2	64,594	95.8	59,253	101.1	123,847	98.3
OPV3	63,994	94.9	59,034	100.8	123,028	97.6
OPV4	62,615	92.8	58,996	100.7	121,611	96.5
DTP+Hib1 *	65,164	96.6	57,792	98.6	122,938	97.5
DTP+Hib2	63,924	94.8	59,340	101.3	123,264	97.8
DTP+Hib3	63,312	93.9	59,034	100.8	122,346	97.1
Pneumovax1-3 **	–		–		–	
MMR1	63,073	93.5	60,549	103.3	123,622	98.1
MMR2	62,596	92.8	58,996	100.7	121,592	95.5
DTP4	62,330	92.4	58,996	100.7	121,326	96.3
DT(School H.P.)	61,218	99.3	46,007	99.9	107,225	99.5
dT (School H.P.)	49,530	99.1	34,844	99.7	84,374	99.3

* The pentavalent vaccine DTP+Hib+Hep B was only implemented from July 2012

** The Pneumovax was implemented in 2012, data is not complete.

Reported communicable diseases

All doctors who detect or suspect a notifiable communicable disease have to fill in a Communicable Disease Notification Form and report it to the DPHCD. The diseases covered by the EPI programme have to be reported immediately, weekly or monthly depending on the disease (Category A, B, C). The diagnosis depends on clinical, epidemiological and microbiological findings. There are published case definitions for the diseases in the Communicable disease registry and they are



often classified into suspected, probable and confirmed cases depending on the certainty of the diagnosis. Since the registry only cover reported cases, patients with a notifiable communicable disease who don't go to the health services or if the health services does not recognise or diagnose the case, it will not be reported in the registry. This underreporting will vary with the disease.

Table 3. Reported cases and rates of vaccine-preventable diseases, Palestine, 2012

Disease	West Bank		Gaza Strip		Palestine	
	Numbers	Rate	Numbers	Rate	Numbers	Rate
Tuberculosis						
Pulmonary	12	0.4	12	0.7	24	0.6
Extra-pulmonary	3	0.1	4	0.2	7	0.2
Hepatitis B *						
Total	830	31.0	354	21.2	1184	27.2
Acute	26	1.0	–	–	–	–
Chronic	804	30.0	–	–	–	–
Poliomyelitis	0	0	0	0	0	0
Acute flaccid paralysis (AFP)	12	1.2	9	1.3	21	1.2
Diphtheria	0	0	0	0	0	0
Pertussis **	176	6.6	–	–	–	–
Tetanus						
Neonatal	0	0	0	0	0	0
Tetanus						
Adult	0	0	0	0	0	0
Hib meningitis			1	0.1	1	0
Measles	1	0	0	0	1	0
Mumps §	29	1.1	60	3.6	89	2
Rubella	1	0	0	0	1	0

The rates are per 100,000 population.

* Separate data for acute and chronic cases of hepatitis B is not available for the Gaza Strip in 2012

** In the West Bank only microbiologically positive, lab confirmed cases are included. In the Gaza Strip lab testing for pertussis is not available.

§ In the West Bank only lab confirmed cases are included; in the Gaza Strip only clinical cases are included, no lab confirmation is available.

For calculating the rates of disease in Palestine, the following population figures from PCBS were used: West Bank: 2.68 million; Gaza 1.67 million; Palestine 4.35 million.

Diseases

Tuberculosis

Tuberculosis is primarily spreading by droplets from a person with active lung infection. The bacteria can stay latent for long periods before activating as an infection in the lungs or other organs. The diagnosis depends on clinical symptoms, X-ray imaging and various microbiological investigations. Medical treatment is free of charge by directly observed treatment, short course (DOTS) for 6-9 months if the patient is immunosuppressed or the bacterium is multi-resistant.

The BCG vaccine confers some protection against tuberculosis, varying from country to country and the age where the vaccine is given. However, almost all studies show high protection against severe disease in the child's first years of life. The overall coverage of the BCG vaccine given at birth in Palestine the past 10 years has varied between 94% in 2006 and 108% in 2010. There are no known pockets of unvaccinated children.

Table 4. Reported new cases of active tuberculosis (pulmonary and extra-pulmonary), Palestine, 2009-2012

	2009*		2010*		2011*		2012	
	Pulm.	Extra-pulm.	Pulm.	Extra-pulm.	Pulm.	Extra-pulm.	Pulm.	Extra-pulm.
West Bank	7	8	10	2	6	3	12	3
Rate	0.3	0.3	0.4	0.08	0.2	0.1	0.4	0.1
Gaza Strip	12	6	9	10	13	10	12	4
Rate	0.5	0.4	0.6	0.7	0.8	0.6	0.7	0.2
Palestine	19	14	19	12	19	13	24	7
Rate	0.48	0.35	0.5	0.3	0.5	0.3	0.6	0.2

The rates are per 100,000 population.

* Some of the numbers from the years 2009, 2010 and 2011 have been updated and are not identical with the numbers in the Annual report of that year



Table 5. Reported cases of active pulmonary tuberculosis by age group, Palestine, 2012

Age group	West Bank	Gaza Strip	Total
<15	0	1	1
15-25	3	0	3
26-45	3	4	7
46-60	1	4	5
>60	5	3	8
Total	12	12	24

The one diagnosed child in the Gaza Strip with pulmonary tuberculosis had received BCG vaccination at birth. Information about vaccination status of the others, treatment results or the number of multidrug resistant cases was not available at the time of analysis.

The reported incidence of active tuberculosis (pulmonary and extra-pulmonary) is below 1 per 100,000 population. This is much lower than any of the neighbouring countries (for 2011: Egypt 17; Jordan 6; Israel 5.8; Lebanon 15, all per 100,000 population¹) and are indeed among the lowest rates reported from any country in the world. This extremely low reported rate can be the real incidence, and many factors can contribute to this: Palestine is a sealed environment with limited migration of people, especially from high-incidence countries; there are no driver groups or population pockets with high uncontrolled transmission (for example injecting drug users, groups refusing vaccination, HIV positives), and there is a good detection and follow-up service from the health authorities. However, since the rates are exceptionally low and underreporting cannot completely be ruled out, more studies to probe further into this is advisable.

Hepatitis B

Hepatitis B is a viral disease which can cause acute and chronic infections in the liver. Chronic hepatitis is the most common cause of liver cancer in the world. The virus is transmitted through blood and sexual contact. Worldwide most chronic carriers have contracted the virus in utero or during birth. Vaccination at birth will confer very good immunity. Three doses of the vaccine are necessary to get

¹ <http://www.who.int/tb/country/data/profiles/en/index.html>

long term protection. Many infected persons will have no or few symptoms. Consequently, a blood test is needed to show whether a person is infected, immune or a chronic carrier. Reported cases to a certain extent reflect testing activity and not necessarily the number of newly infected.

The hepatitis B vaccine was introduced to EPI in 1992-1993. The first dose of vaccine is given at birth. The overall coverage of the hepatitis B vaccine over the past 10 years in Palestine has been high. The coverage of the first dose has varied between 90 % in 2006 and 104 % in 2010. For the third dose the coverage has varied from 91% in 2006 and 101% in 2010 and 2011. There are no known pockets of unvaccinated children.

The diagnosis of hepatitis B is mainly based on serological markers (lab tests), which can differentiate between acute disease and a chronic carrier state. Additionally, diagnosed patients may have clinical signs of liver disease. The number of carriers is to a larger degree reflected by the rate of testing than the epidemiological situation.

Table 6. Reported cases of acute and chronic hepatitis B, Palestine, 2009-2012

	2009*			2010			2011*			2012		
	Ac.	Chr.	Tot.	Ac.	Chr.	Tot.	Ac.	Chr.	Tot.	Ac.	Chr.	Tot.
West Bank	21	1,037		27	966		23	847		26	804	
Rate	0.9	42.3		1.2	42.4		0.9	32.8		1	30	
Gaza Strip			357			407			375			354
Rate			24			26.5			23.6			21.2

Ac.: Acute; Chr.: Chronic; Tot.: Total

The rates are per 100,000 population

* Some of the numbers from the years 2009 and 2011 have been updated and are not identical with the numbers in the Annual report of that year

In the West Bank acute and chronic cases of hepatitis B are reported separately, whereas in the Gaza Strip a combined figure is reported. Consequently it is not possible to present a combined figure for Palestine. From 2013 Gaza will also report acute and chronic cases separately.

Of the 26 reported acute cases in the West Bank we have the age group distribution for 23. Of these only 7 were between 15-25 years, and none below 15, indicating a good effect of the vaccination programme.

The hepatitis vaccine has been a part of the EPI in Palestine for 20 years. As the programme continues, the disease will likely be eliminated from the population.





Poliomyelitis

Poliomyelitis is caused by a virus transmitted by ingestion mainly of contaminated water and can cause an acute gastro-enteral infection. In a minority of the infected the disease will progress to meningitis and myelitis and cause acute flaccid paralysis (AFP). All cases of AFP need to be investigated and examined for poliovirus in stool samples. The rate of AFP cases detected is a measure of sensitivity of the surveillance system for detecting poliomyelitis cases. Through extensive efforts by the world's countries and coordinated by WHO, poliomyelitis is almost eradicated. The two main remaining hotspots of the disease are Nigeria and Pakistan sometimes spilling into the neighbouring countries. There are two types of polio vaccine, an inactivated polio vaccine (IPV) given as an injection and a live, attenuated oral polio vaccine (OPV). Immunity is more than 90 % after two doses. Booster doses are recommended because immunity decreases over time. In Palestine OPV and IPV is recommended for all children.

The overall coverage of the three basic doses of the OPV in Palestine has always been high. The coverage of the third dose of OPV in the past 10 years has varied between 96% in 2006 and 103% in 2009. There are no known pockets of unvaccinated children.

No case of indigenous poliomyelitis has been diagnosed in Palestine since 1988. The WHO sensitivity target for AFP surveillance is ≥ 1 reported non-polio AFP cases per 100 000 children under 15 years of age. The rate is now above that for both the West Bank and the Gaza Strip, which is an indication of good surveillance.

Table 7. Reported cases of acute flaccid paralysis (AFP), Palestine, 2009-2012

	2009	2010	2011	2012
West Bank	14	11	11	12
Rate	1.4	1.2	1.1	1.2
Gaza Strip	4	4	6	9
Rate	0.6	0.6	0.9	1.3
Palestine	18	15	17	21
Rate	1.1	0.9	1	1.2

The rates are per 100,000 children under 15 years

It is important to continue with vaccination and AFP surveillance until polio is completely eradicated and confirmed by WHO.

Diphtheria

Diphtheria is a respiratory disease caused by a bacterial toxin, and is spread through contact and droplets. In addition to severe obstructive respiratory disease it can cause damage to various organs like heart, nerves, liver and kidneys. The disease is still endemic in large parts of the world. Diagnosis is based on a typical clinical picture of pharyngeal membranes and on microbiological confirmation. The vaccine consists of diphtheria toxins, confers excellent protection and is usually given in combination with vaccines against tetanus, pertussis and Hib. Booster doses are needed to maintain protection.

The overall coverage of all three basic doses of the diphtheria vaccine given as a combination of DTP-Hib the past 10 years in Palestine has varied between 90% in 2006 and 101% in 2010 and 2011. There are no known pockets of unvaccinated children.

There have been no reported cases of diphtheria in Palestine over the past decades. With prolonged absence of disease many (especially Western) countries have experienced increasing reluctance of parents to let their children be immunised. Consequently it will be important to continuing encouraging parents to vaccinate their children against diphtheria, even in the absence of the disease.



Pertussis

Pertussis or whooping cough is a droplet-borne bacterial disease causing prolonged paroxysms of whooping cough lasting for periods up to several months after an initial period of cold-like symptoms. The disease can be fatal for children under 2 years, and especially for infants. Partially immune people can have less characteristic symptoms. Diagnosis is based on typical clinical symptoms, antibodies in a blood test and on microbiological examinations (culture and PCR). The number of reported cases will to a larger degree reflect the number of patients coming to the doctor and being tested, than the real number of cases. Underreporting is likely to be large.

The vaccine is usually given in combination with vaccines against tetanus, diphtheria and Hib. After the basic three doses the protection against classic disease is excellent, but wanes gradually after the age of two years if booster doses are not given.

The overall coverage of all three basic doses of the pertussis vaccine given as a combination of DTP-Hib the past 10 years in Palestine has varied between 90% in 2006 and 101% in 2010 and 2011. There are no known pockets of unvaccinated children.

In the West Bank only microbiologically positive, lab confirmed cases are included. In the Gaza Strip lab testing for pertussis is not available. Consequently it is not possible to give reported rates of infection for Palestine.

Table 8. Reported confirmed cases of pertussis, Palestine, 2009-2012

	2009*	2010	2011	2012
West Bank	57	45	36	176
Rate	2.3	2	1.4	6.6
Gaza Strip	–	–	–	–
Rate				

The rates are per 100,000 population

* The number from the year 2009 in the West Bank has been updated and are not identical with the number in the Annual report of that year

Table 9. Vaccination status and age distribution of the confirmed pertussis cases, Palestine, 2012

Age	<2 m.	2-3 m.	4-5m.	6-11 m.	12-23 m.	>24 m.	Total
Vacc. St.	0 doses	1 dose	2 doses	3 doses	3-4 doses	4 doses	
Cases	78	60	17	7	0	14	176

m. = months; Vacc. St. = Vaccination status

The reported number of lab confirmed cases of pertussis will only reflect the tip of the iceberg of the real number of cases. Almost all reported cases are among the most vulnerable children, those under 2 years of age. The age range of the 14 people above 24 months is between 4 and 27 years. It is important to monitor disease in this age group closely, and to test for the disease in cases of sudden infant death syndrome (SIDS). The source of infection in young children is often older siblings and adults in the family of the child. Several countries have introduced booster doses of pertussis vaccine to older children and adults with waning immunity in order to protect the most vulnerable infants. If this is to be considered in Palestine, an assessment weighing pros and cons should be carried out.

Tetanus

Tetanus is caused by toxins from a bacterium that is readily detected from soil and from the larger intestines of many animals. Bacterial spores enter the body via contaminated wounds and grow well under anaerobic conditions in the lacerated tissue. The disease manifests itself with muscular stiffness of the jaws progressing to more generalised painful muscular spasms. Neonatal tetanus has been especially feared as the mortality is high. The diagnosis is clinical; microbiological tests are of little additional value as they often are negative. In many countries, there is a tendency of underreporting of disease as it is only relying on the clinician remembering to report.

The vaccine is usually given in combination with vaccines against pertussis, diphtheria and Hib. After the basic three doses almost all vaccinated are protected against disease. But the immunity wanes gradually and boosters are recommended every ten years for full protection to be maintained.



The overall coverage of all three basic doses of the tetanus vaccine given as a combination of DTP-Hib the past 10 years in Palestine has varied between 90% in 2006 and 101% in 2010 and 2011. There are no known pockets of unvaccinated children.

Table 10. Reported cases of tetanus, Palestine, 2009-2012

	2009		2010		2011		2012	
	Neon.	Older	Neon.	Older	Neon.	Older	Neon.	Older
West Bank	1	0	0	0	1	1	0	0
Rate	0	0	0	0	0	0	0	0
Gaza Strip	0	0	0	0	0	0	0	0
Rate	0	0	0	0	0	0	0	0
Palestine	1	0	0	0	1	1	0	0
Rate	0	0	0	0	0	0	0	0

Neon. = Neonatal

The rates are per 100,000 population

There were no reported cases of tetanus in Palestine in 2012. This can be the real situation, reflecting the very high vaccination coverage among children and active case finding in hospitals. However, we cannot totally rule out underreporting, especially in the elderly as immunity wanes with time.

Haemophilus influenzae type B disease, invasive (meningitis and septicaemia)

Haemophilus influenzae is a bacterium being part of the normal upper respiratory tract and can cause various respiratory tract infections. The capsular type B of the bacterium is more prone to cause epiglottitis and invasive disease and used to be a common cause of meningitis and septicaemia in small children. Clinical symptoms of meningitis and septicaemia are mostly unspecific as to the microbiological cause, and cultures of the blood and cerebrospinal fluid are needed to confirm the microbiological agent.

The Hib vaccine is a conjugated capsular polysaccharide vaccine inducing more than 90 % protection after three doses and lasting for a number of years. Boosters are therefore not needed.

The overall coverage of all three basic doses of the Hib vaccine given as a combination of DTP-Hib since the introduction in 2007 in Palestine has varied between 96% in 2012 and 102% in 2010 for the third dose. There are no known pockets of unvaccinated children.

Table 11. Reported confirmed cases of Hib meningitis, Palestine, 2009-2012

	2009	2010	2011*	2012
West Bank	0	2	0	0
Rate	0	0.1	0	0
Gaza Strip	0	0	3	1
Rate	0	0	0.2	0.1
Palestine	0	2	3	1
Rate	0	0.1	0.1	0

The rates are per 100,000 population

* The number from the year 2011 has been updated and are not identical with the number in the Annual report of that year.


The one case in Gaza in 2012 was a 2 month old child who received its first dose of Hib vaccine 5 days before the onset of the disease.

In all countries that have introduced the Hib vaccine, a sharp drop in infections has been observed among the vaccinated children as well as the older population; so also for Palestine where almost no cases have been detected since 2007. Although there might be some underreporting of bacterial septicaemia and meningitis because a blood or CSF culture is not taken of all patients with clinical signs of septicaemia or meningitis, the great majority of these patients will have other microbiological causes than Hib.

Pneumococcal disease, invasive (meningitis and septicaemia)

The pneumococcus is divided into more than 90 serotypes of bacteria, and is one of the most common causes of pneumonia and other respiratory tract infections, and of invasive bacterial infections (septicaemia and meningitis). Invasive disease has a mortality of 10-40% and affects especially small children and the elderly. As for Hib, disease invasive pneumococcal disease is confirmed by microbiological cultures of the blood and cerebrospinal fluid.





The pneumococcal vaccine is a conjugated vaccine containing capsular polysaccharide from the most common serotypes. It confers 97% protection against invasive disease of the serotypes in the vaccine.

The pneumococcal vaccine was introduced into the childhood immunisation programme in Palestine in 2011. There are still no complete figures of vaccination coverage for this first year, but coverage seems to be good, as for other vaccines in the EPI.

For 2012 there is not routine reporting of cases of pneumococcal septicaemia or meningitis. However, there are plans to include this as a reportable disease for 2013. In general there should be surveillance of all diseases with vaccines included in the EPI.

Measles

Measles is one of the most contagious diseases known to man, which spreads through airborne transmission. It is especially feared in emergency settings. It causes general malaise, fever and a rash and can cause a range of complications, including brain damage. The measles diagnosis should not be based on the rash and clinical symptoms alone, but also on a blood test detecting measles antibodies.

The measles vaccine contains live, attenuated virus and is usually given as a MMR combination together with a vaccine against mumps and rubella, but sometimes also given as a single vaccine. Immunity is conferred to over 95% after the first dose, and increases somewhat after the second dose. Over the years the protection wanes slightly. Until November 2011 a separate measles vaccine dose was given at 9 months and the MMR vaccine given at 12 and 18 months. Currently only the MMR is given.

The overall coverage for the measles vaccine the past 10 years in Palestine has varied between 84% in 2006 and 96% in 2012 for the second dose, and being above 90% for most of the years. There are no known pockets of unvaccinated children.

Table 12. Reported cases of measles, Palestine, 2009-2012

	2009	2010	2011	2012
West Bank	0	1	0	1
Rate	0	0	0	0
Gaza Strip	0	0	0	0
Rate	0	0	0	0
Palestine	0	1	0	1
Rate	0	0	0	0

The rates are per 100,000 population

Only one case of measles was confirmed and reported in 2012, and 155 suspected cases were confirmed not to be measles. The patient was a boy <5 years who had received one dose of MMR vaccine.

There are very few reported cases of measles in Palestine. In addition to the confirmed cases, patients with fever and skin rash are to be reported as suspected cases and tested for measles and rubella. Currently ca. 4 discarded suspected cases per 100,000 population are being reported from the West Bank, indicating a low risk of underreporting.

Mumps

Mumps is a viral inflammation of the salivary glands (parotitis epidemica) and spreads through droplets. It can also cause meningitis and encephalitis in severe instances and inflammation of the testicles in men falling ill after puberty. Clinical diagnosis should be supported by testing for antibodies in a blood test.

The mumps vaccine contains live, attenuated virus and is given as a MMR combination together with a vaccine against measles and rubella. Immunity is conferred to over 95% after the first dose, and increases somewhat after the second dose. Over the years the protection wanes a somewhat.

Since 1995 all children have been offered a dose of the MMR vaccine at age 12 months, and from 2009 a second dose of MMR. The overall coverage for vaccine against mumps over the past 10 years in Palestine has varied between 84% in 2006 and 126% in 2009 for the first dose of MMR. For the second dose given since 2009 the reported coverage has been 91%-96%. A vaccination campaign in 2006



giving a second dose of MMR vaccine was only carried out in the West Bank and not the Gaza Strip. As a consequence, most children age 5-15 years in the Gaza Strip, have only received one dose of the MMR vaccine.

Table 13. Reported cases of mumps, Palestine, 2009-2012

	2009*			2010			2011			2012		
	S	C	T	S	C	T	S	C	T	S	C	T
West Bank		87			70			62			29	
Rate		3.6			3.1			2.4			1.1	
Gaza Strip	34			89			91			60		
Rate	2.3			5.8			5.7			3.6		
Palestine			121			159			153			89
Rate			3.1			4.2			3.7			2

Suspected (S), Confirmed (C), and Total (T)

The rates are per 100,000 population

* The numbers from the year 2009 have been updated and are not identical with the numbers in the Annual report of that year.

The rates of mumps is not completely comparable between the West Bank and the Gaza Strip as the former report confirmed cases and the latter suspected cases. This will probably lead to fewer cases being reported from the West Bank.

Of the 29 confirmed cases of mumps in the West Bank, we have information about 27 patients. Of these 4 were under 1 year, 12 were 1-5 years, 10 were 6-14 years and 1 was 15-25 years. The number of confirmed cases among young people indicates that some children are not protected by the vaccine, either because they have not been vaccinated, or the vaccine did not induce immunity.

Rubella

Rubella is a viral disease usually giving a rather mild febrile illness with a rash. During pregnancy rubella can give serious disease to the foetus. During the first trimester of pregnancy there is a 50-80% risk of abortion or malformations if the mother contracts rubella. Later in the pregnancy the risk diminishes. The rubella rash is rather unspecific, and positive microbiological findings are necessary for confirming the disease.

The rubella vaccine contains live, attenuated virus and is given as a MMR combination together with a vaccine against measles and mumps. Immunity is conferred to 98% after the first dose, and increases somewhat after the second dose. Over the years the protection wanes a little. In countries like Palestine, where MMR is part of the immunisation programme, the rubella virus is no longer circulating and naturally immunising girls and young women. That leaves a risk for unvaccinated women to contract rubella during pregnancy. Consequently it is very important to maintain very high vaccination coverage in rubella vaccinating populations like the Palestinian one.

The overall coverage for vaccine against rubella over the past 10 years in Palestine has varied between 84% in 2006 and 126% in 2009 for the first dose of MMR. There are no known pockets of unvaccinated children.

Table 14. Reported confirmed cases of rubella, Palestine, 2009-2012

	2009	2010	2011	2012
West Bank	1	2	1	1
Rate	0	0.1	0	0
Gaza Strip	0	0	0	0
Rate	0	0	0	0
Palestine	1	2	1	1
Rate	0	0.1	0	0

The rates are per 100,000 population

Only one confirmed case of rubella was reported in 2012. This was a pregnant woman at the very end of pregnancy where the risk of harm to the unborn child is the smallest. All cases of rubella warrants detailed investigation in order to detect the source of infection and to elucidate any possible vaccine failure.

There are very few reported cases of rubella in Palestine. As described for measles, in addition to the confirmed cases, patient with fever and skin rash are to be reported as suspected cases and tested for measles and rubella. Currently ca. 4 discarded suspected cases per 100,000 population are being reported from the West Bank, indicating a low risk of underreporting.



Vaccine-preventable diseases surveyed, but not in the EPI

Meningococcal disease

Meningococcal disease is caused by a group of bacteria with different virulent potentials. Some people harbour potentially pathogenic meningococci as part of their respiratory flora, spreading it through droplets. There are five main pathological groups, A, B, C, Y and W135, all of which can cause invasive disease in the form of septicaemia and meningitis. In a belt across Africa South of Sahara annual outbreaks of invasive meningococcal disease occur, and outbreaks have also been reported in conjunction with the Hajj pilgrimage to Mecca.

Clinical symptoms of meningitis and septicaemia are mostly unspecific concerning the causative agent. However, for meningococcal septicaemia a petechial rash is often observed. Microbiological cultures of the blood and cerebrospinal fluid are needed to confirm the diagnosis. Detection of Gram negative diplococci in blood or cerebrospinal fluid are indicative but not confirmative of meningococci, microbiological culture and serotyping or genetic sequencing should be carried out for all suspected cases of meningococcal disease in order to verify the causative agent.

There are commercially available conjugated polysaccharide vaccines against four of the five most common serogroups of meningococci, A, C, Y and W135, but not against serogroup B. When there is a case of meningococcal disease that occurs, it is important to quickly detect the serogroup in order to decide whether to vaccinate close contacts.

Table 15. Reported cases of meningococcal meningitis, Palestine, 2009-2012

	2009	2010	2011	2012
West Bank	8	14	1	3
Rate	0.3	0.6	0	0.1
Gaza Strip	132	104	151	103
Rate	8.9	6.8	9.5	6.2
Palestine	140	118	152	106
Rate	3.6	3.1	3.6	2.4

The rates are per 100,000 population

Table 16. Distribution of cases of meningococcal disease in the Gaza Strip, 2012

Blood culture	CSF culture	Gram stain	Skin smear	Clinical meningococemia	Total
6	23	16	47	11	103

All 29 culture positive cases were meningococcus group B.

There is a large difference in the incidence rate of reported cases from the West Bank and the Gaza Strip. The difference may in part be explained by a difference in practice of what is reported. However, even if only counting culture confirmed cases there are many more cases in Gaza. It is also worth noting that only group B meningococci has been detected in Gaza.

Discussion

The surveillance system for communicable diseases and vaccinations in Palestine is robust and well established. For certain diseases there is a discrepancy in what is being reported between the West Bank and the Gaza Strip, making it difficult to compare the two areas. The Health Annual Report from MoH only presents basic tables and figures and little interpretation making it somewhat difficult fully to assess the situation.

The burden of vaccine-preventable disease in Palestine is very low for most vaccine-preventable diseases, mostly thanks to very high vaccination coverage and a good follow-up of disease from the health care services. However, there are some areas we recommend MoH looking into.

Surveillance systems

Vaccination coverage

When vaccination coverage rates exceed 100%, it clearly indicates that there is something wrong. Most probably the main reason is an incomplete Population Register where not all children who receive immunisation are included. We recommend the Ministry of Interior to improve the completeness of the Population Register.





Tuberculosis

The reported rate of active tuberculosis in Palestine is among the lowest reported rates in the world. Many factors that are special for Palestine indicate that this may be a true rate: Palestine is a sealed environment with limited migration of people, especially from high-incidence countries; there are no driver groups or population pockets with high uncontrolled transmission (for example injecting drug users, groups refusing vaccination, HIV positives), and there is a good detection and follow-up service from the health authorities. However, always when very low rates are detected, it is advisable to look more closely into the matter to explore whether the rate can be due to some underreporting. Studies are underway to try and assess this.

Hepatitis B

The reported incidence of hepatitis B partly reflects serological testing activity, especially for non-acute cases, but also for acute hepatitis as many infected will have few and unspecific symptoms. For surveillance purposes it is important to separate acute and chronic cases and conduct surveillance the same way in the West Bank and the Gaza Strip. From 2013 Gaza will also report acute and chronic cases of hepatitis B separately.

Poliomyelitis

The surveillance of poliomyelitis in Palestine is very good. However, the situation in the region is volatile and unpredictable due to political unrest and migration of people, and due to the detection of wild poliovirus in the sewage and in healthy carriers in several locations in the region. Consequently it is advisable to look at all the different surveillance systems and inventories for environmental (sewage monitoring), vaccination (vaccination registry), immunity (serological surveillance), disease (AFP and healthy carriers) and of infrastructure issues (cold chain and logistics) and assess whether there are any risks or weaknesses that should be improved.

Note: This technical review was finalised in August 2013. Since then there have been substantial development regarding poliomyelitis. These developments are not reflected in this document.

Pertussis

To confirm clinical symptoms of pertussis, microbiological lab testing is required. This can either be performed by specific serological tests, by culture or by so-called PCR technique. In Palestine detection of the bacteria by the lab is required for calling it a “confirmed case”. As lab testing for pertussis currently is not available in the Gaza Strip, there is in practice no functional surveillance of pertussis there. We recommend making microbiological testing available for all areas of Palestine. In the West Bank, only cases in children have been reported. This may reflect the testing activity and not the true incidence of the disease. Consequently only the tip of the iceberg of real cases in Palestine is detected, tested, and reported to the national authorities.

A review of the surveillance of pertussis may come up with new suggestions and recommendations for who the clinicians should test for the disease (test indication) and how and where to analyse microbiological specimens.


Tetanus

In most countries in the world tetanus is underreported because it is a clinical disease not supported by microbiological examination, and clinicians have a natural tendency to focus on the treatment and wellbeing of the patient rather than reporting to the authorities. The low incidence of tetanus in Palestine is most certainly due to the high level of immunity in the population due to the high vaccination coverage. However, it would be interesting to conduct a study in hospitals to assess whether any cases are missed from reporting.

Invasive bacterial infections (meningitis and septicaemia) caused by Hib, pneumococci and meningococci

Traditionally, most countries have had mainly clinical case definitions for many infections and to a lesser extent used specific microbiological definitions. That is why many countries have used “meningitis” as a reportable disease rather than agent specific diseases like “invasive pneumococcal disease”. With the advancement of microbiological diagnostic abilities, it is easier to have agent-specific disease classifications. This is also supported by the fact that is often difficult to determine





whether the main symptoms are that of meningitis or septicaemia, or a mixture of both. Consequently more and more countries use disease categories like “invasive pneumococcal disease”, “invasive meningococcal disease” and “invasive Hib disease”. Included in these disease categories should be all microbiologically confirmed cases with detection of the agent. For meningococcal disease, a typical, clinical manifestation of a petechial rash is also included in most countries as it is almost pathognomonic for the disease.

An active surveillance system should be in place for all diseases covered by the childhood immunisation programme. After the introduction of the pneumococcal vaccine in Palestine in 2011, surveillance of pneumococcal disease is underway. It is recommended that the surveillance also look at serotypes of pneumococci to assess the incidence of strains covered and not covered by the vaccine. Attention should also be paid to the surveillance of meningococcal disease as there are large differences in the number of reported cases from the West Bank and the Gaza Strip. Further studies could be carried out on the culture confirmed cases in Gaza to determine whether the high incidence is monoclonal or polyclonal.

Mumps

Symptoms of mumps are typically quite obvious with a unilateral or bilateral swelling of the parotid or other salivary glands. In Palestine microbiological confirmation is required for calling it a “confirmed case”. There is no lab testing for mumps available in the Gaza Strip. Consequently only suspected cases are reported. It is advisable to have equal surveillance in the West Bank and the Gaza Strip, and to make testing available for all areas of Palestine.

Disease and prevention

Poliomyelitis

No case of polio has been detected in Palestine since 1988, the vaccination coverage is high, and the surveillance of acute flaccid paralysis is sensitive. With the detection of wild poliovirus in the sewage and in healthy carriers in several locations in the region, one should assess the vulnerability of the Palestinian

population and discuss whether to recommend booster doses of vaccine to any groups of the population. This is particularly relevant for the Gaza Strip which is vulnerable due to overcrowding, and a partly disrupted sewage system.

Pertussis

Many countries in the world have recorded an increase in reported cases of pertussis. The disease is distressing for many people with prolonged and exhaustive coughing, and can be fatal for children under 2 years, and especially for infants. Several countries have introduced booster doses of pertussis vaccine to older children and adults with waning immunity in order to protect the most vulnerable infants. If this is to be considered in Palestine, it is advisable to first carrying out an assessment weighing pros and cons.


Meningococcal disease

The high reported incidence of meningococcal disease in the Gaza Strip should be assessed in greater detail to get firm evidence of the magnitude of the problem, and details of the strains of the bacteria. Then a systematic assessment is recommended to evaluate whether it will be beneficial to offer a meningococcal vaccine to groups in the population. If group B meningococci is the dominant group, no approved vaccine is commercially available. However, there are scientific vaccine trials for group B vaccines being carried out, and that might be of interest for Palestine.

Mumps

The vaccination coverage for the MMR vaccine is high in Palestine although there is a gap among most children 5-15 years old in the Gaza Strip who only have received only one dose of the MMR vaccine. Still almost all children born since 1995 should be protected against mumps having received at least one dose of the vaccine. In the West Bank between 29 and 84 lab confirmed cases of mumps (rate 1.1-3.4 cases per 100,000 population) have been reported each year the last four years. The rates in the Gaza Strip are even higher (2.3-5.8 per 100,000), but are less reliable as they are suspected cases only.





The number of reported cases of mumps in a population that is mostly vaccinated indicates some level of vaccine failure (either failure to induce immunity from the vaccine or the failure to vaccinate all) and this warrants further investigations. We recommend investigating closely all diagnosed, determine the vaccination status and elucidate the possible source of infection.

Revaccinations after childhood

For several diseases immunity against disease is slowly waning after immunity is achieved through the childhood vaccination programme. This is especially true for pertussis, but also for other diseases like polio, diphtheria and tetanus. Many countries recommend revaccination every 10-15 years for people who may be exposed to these microbes. An assessment of the situation can be carried out in Palestine. One element in such an assessment could be to study the population immunity through a representative serological survey of antibodies against selected diseases. A recommendation of revaccination should not be given before arguments pro and contra have been studied carefully.

Conclusions

The surveillance system for communicable diseases and vaccinations in Palestine is robust and well established. For certain diseases we have made some suggestions for possible changes.

The burden of vaccine-preventable disease in Palestine is very low for most vaccine-preventable diseases. However, there are a few areas where we recommend for MoH to look into.

Recommendations

Surveillance systems

- Work with the MoI to improve the Population Register to get correct denominator figure for the data on vaccination coverage.
- Conduct an assessment on whether the very low rates of tuberculosis true or if there can be some level of underreporting.
- Separate reporting of acute and chronic hepatitis B from the Gaza Strip. Make sure that the case definitions and the reporting are the same in both areas.
- Reassess surveillance for poliomyelitis in light of the detection of wild poliovirus in the sewage and in healthy carriers in the region.
- Ensure availability of lab testing for pertussis in the Gaza Strip. Make sure that the case definitions and the reporting are the same in both areas. Review the recommendations for who should be tested for pertussis.
- Assess whether some clinical cases of tetanus are missed.
- Implement surveillance of invasive pneumococcal disease, including serotyping of cultured pneumococci.
- Consider reorganising reporting of invasive bacterial infections to include both meningitis and septicaemia and all confirmed detections of meningococci, pneumococci and Hib in samples from blood and CSF.
- Consider improving diagnostic capabilities for meningococci in the Gaza Strip, including a more detailed characterisation of the bacteria.
- Ensure availability of lab testing for mumps in the Gaza Strip. Make sure that the case definitions and the reporting are the same in both areas.





Disease and prevention

- After an assessment, consider offering a booster dose of the polio vaccine to defined groups in light of the detection of wild poliovirus in the sewage and in healthy carriers in the region.
- Assess the pertussis situation in Palestine and consider whether to recommend a booster dose of the pertussis vaccine to defined groups of older children and adults.
- Assess the situation for meningococcal disease in the Gaza Strip, and based on the results consider whether to recommend meningococcal vaccine to defined groups.
- Investigate all confirmed cases of mumps and assess on an individual and population level the reasons for having relatively many cases.

References

- Annual report 2009-2012, MoH
- Preventive Medicine Department Policy in Prevention and control of Communicable Diseases in Palestine. MoH, 2011.



