

DPR Korea



World Health  
Organization

REGIONAL OFFICE FOR South-East Asia

# Eliminating measles

A look at how Democratic  
People's Republic of Korea  
did it



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REGIONAL OFFICE FOR

**World Health  
Organization**

**South-East Asia**

## **Eliminating Measles: A look at how Democratic People's Republic of Korea did it**

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A group of people, mostly women in traditional Korean Hanbok, are performing a dance in a park. They are in a circle, with some in the foreground and others further back. The background is a dense forest of trees. The entire image has a reddish-pink tint.

“The country, created by the will of the people  
Facing the furious waves with thunderous force.  
Let’s glorify this Korea forever,  
Infinitely rich and strong.”

As the national anthem says, the country has indeed faced the furious wave of measles virus with thunderous force and eliminated it from its soil.

Photos: © ERIC LAFFORGUE/Alamy Stock Photo

# FOREWORD

It is with great pleasure that I congratulate Democratic People's Republic of Korea on its historic elimination of measles. This achievement is a testament to the country's ambition and commitment to achieving the highest attainable standard of health for all.

In recent years the Government of DPR Korea has taken remarkable strides to not only pursue but achieve the goal of measles elimination two years ahead of the 2020 target.

Through scrupulous planning, the clear allocation of responsibilities and efficient implementation, the country has demonstrated what determination and strong resolve can achieve.

In close cooperation with the World Health Organization, alongwith other UN agencies helping to align the country with international benchmarks, the Ministry of Public Health was able to implement effective surveillance, reporting and immunization programmes to combat this highly infectious disease, bringing cases down to a mere handful in 2014 and eliminating the disease by 2018.

DPR Korea's example is a shining example to other nations struggling to control infectious diseases, and WHO very much looks forward to its continued partnership with DPR Korea as it continues to provide assistance and support in the control and elimination of other vaccine-preventable diseases.



**Dr Poonam Khetrpal Singh**

Regional Director

WHO South-East Asia Region



12

Provinces

3

Directly  
governed  
cities

25 030 070

Total population

1 696 094

Under-five population

17.68/1 000

Under-five mortality



# A DREADED VIRUS

A dry cough, fever, red, itchy eyes and the ubiquitous red rash. Classic symptoms of measles – once a common childhood illness that people accepted as part of the pains of growing up, fearing its advent and relieved when it passed without causing death or any long-term distress. In the age before modern medicine, traditional healers would prescribe dried eggplant as a treatment as they waited for the rash to dry.

Measles has no cure. The only method of overcoming this deadly virus is through prevention. The Democratic People's Republic of Korea (DPR Korea) took the first steps in its journey to eliminate measles as early as 1967, when it introduced the indigenous measles-containing vaccine (MCV) into its health system. Since then, the country has made remarkable progress in keeping its people immune to this disease.

**How did DPR Korea manage to bolster the immunity profile of its people? The following pages will take you on a journey of resolve and hope that the day is not far when measles will be a thing of the past globally, known only in the annals of medical history.**

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<sup>1</sup> Simply Eggplant: Kosher recipes from around the world by Shirley Smalheiser. Gefen Publishing House, Jerusalem

# SIGNIFICANT EVENTS

**2018**

Verification that DPR Korea has eliminated measles

**2015–2016**

MR SIA for children aged 12 months–16 years in select areas

**2014**

Country's surveillance system ably detects three imported cases of measles from neighbouring country

**2008**

Introduction of MCV2; first accreditation of the National Laboratory for MR by WHO

**2007**

Nationwide MCV SIA for individuals ranging from 6 months to 45 years of age subsequent to successfully managing a huge measles outbreak

**2006**

Introduction of disease surveillance for measles and rubella

**1997**

Switch to WHO prequalified MCV

**1967**

Introduction of MCV1 with domestic vaccine

MCV: Measles-containing vaccine  
SIA: Supplementary immunization activity  
MR: Measles–rubella

# RECOGNIZING THE DEVIL

A mere decade ago, DPR Korea was in the grip of a measles epidemic, with approximately 3500 cases being reported from 30 counties in 2007. Challenged by insufficient laboratory capacity to deal with exanthematous diseases, the country still managed to contain the measles and rubella virus from spreading through boundary quarantine. A dearth of vaccines and vaccination-related resources were also key concerns.

Nonetheless, DPR Korea made good progress in eliminating measles and, as a result of its determined efforts, between 2012 and 2014, only three confirmed cases of imported measles and another three confirmed cases of rubella were reported.

In alignment with government policy aimed at the well-being of the population through disease control as well as the regional goal, DPR Korea was determined to bring down the number of cases to zero. The country surged forward to be at the forefront of the fight against measles in the South-East Asia Region.

**DPR Korea is a low mortality country with an estimated 7000 under-5 deaths from any cause in 2016.**

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*We believe that our children are the makers of tomorrow's history – hence, the need to ensure their good health. Great efforts are being made to save them from the dreaded clutches of preventable diseases.*

**– Head of Child Health Care Department  
Okryu Children's Hospital**

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Regional Director, WHO SEA Region,  
leading discussions on Regional Flagship  
Programme on Measles Elimination

# PREPARING FOR THE FIGHT AGAINST MEASLES

## LEADERSHIP

Given the many challenges DPR Korea has faced, its public health success can be attributed to the sheer will of its political leadership. The Supreme Leader is known to have a keen interest in the health of children and visited the Taesongsan General Hospital in Pyongyang during the measles outbreak of 2014. Such visible leadership helps to power a nation forward to overcome problems, no matter how insurmountable they may seem. As a result, immunization delivery has shown remarkable improvement and can be benchmarked against high international standards.

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*A country can only remain strong if its people are healthy. The leaders have invested a lot of their time and efforts in securing the health of our people*

**– Director of the National Hygiene Inspection Board  
Ministry of Public Health**

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The Ministry of Public Health (MoPH) recognizes the importance of accountability and is clear in its delegation of tasks to the subnational level provincial public health bureaus and county public health departments. This move allowed integration of efforts of health workers with people's deputies and the community. Allocating responsibilities to each person, health bureau and health department has ensured that no gaps or opportunities are missed. Wherever shortfalls are found, prompt action has been taken to rectify the situation and sound plans have been prepared to meet those challenges. Plans are also under way to resume domestic vaccine manufacturing along good manufacturing practices (GMP) so as to ensure sustainability of vaccine supplies for the future.

# PLANNING

The EPI delineates extensive plans to reduce morbidity and mortality from vaccine-preventable diseases, including measles. The cooperation of the Health Ministry with EPI will be further discussed in December 2018 to consolidate the actions being taken against measles. Comprehensive Multi-Year Plans (cMYPs), specific national strategic plans on measles elimination and rubella control, disease reporting to the central and global level and national and subnational EPI reviews supported by time to time international external reviews are also in place at various levels to consolidate immunization activities.

DPR Korea has a two-part National Strategic Plan (NSP) for Measles Elimination and Rubella Control. The first NSP had two parts, covering the period from July 2014–July 2017 and focusing on enhancement of surveillance, reporting, and laboratory strengthening. The second part of the plan, which covers the period from July 2017–July 2019 focuses on increasing immunity against rubella, genotyping and vaccine quality. In 2018, given the context of zero indigenous cases of measles in the country for the last three years, DPR Korea revised the NSP to respond to needs for verification of measles elimination and post-elimination stage maintenance. The country also has a clearly expounded subnational strategic plan for measles and rubella elimination.





# INFRASTRUCTURE

DPR Korea has a three-tier health system that provides for high population coverage. Established in the early 1960s, it comprises a network of approximately 133 hospitals and 6233 primary care “*Ri*” clinics (people's hospitals). *Ri* clinics report to county hospitals which in turn are overseen by referral hospitals

at the provincial level. With a health force of over 215 700, the country has approximately 7.6 health staff for a population of 100 000, indeed a high ratio and one of the best in the Region.

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*The incident of three imported measles cases from China in 2014 strengthened our resolve to introduce and maintain positive reinforcements, and keep watch against such strikes in the future.*

– Head of National Measles and Rubella Laboratory

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In DPR Korea, seeking health care is easy and people do not have to go far to access a doctor. *Ri* clinics and polyclinics meet the primary demands for health care, bringing medical services and the public health system literally to peoples’ doorsteps through a unique system of household doctors. These doctors, who are located at the *Ri* clinics, go from house to house every day, in both rural and urban areas. Full-fledged medical doctors with seven years of training, household doctors serve as front-line health-care providers. Each doctor is responsible for serving 130–170 households in the community with clinical and public health services. In addition, anti-epidemic doctors from the county hygiene and anti-epidemic stations (HAES) support the efforts of household doctors by conducting epidemiological investigations of, and sample collection from, suspected measles and rubella cases identified

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<sup>2</sup> Public Health and International Partnerships in the Democratic People's Republic of Korea. John Grundy, Beverley-Ann Biggs, David B. Hipgrave. Published: December 29, 2015. <https://doi.org/10.1371/journal.pmed.1001929>

by household doctors in the field routinely. In addition to the household doctors, each community has a chief-of-hygiene: a health extension volunteer who has retired from work and resides in the village. This person supports the household doctors to identify families with a sick child.

## PARTNERSHIPS

Although overseas development assistance in DPR Korea is extremely low (USD 1.21 per capita in 2013), the country recognizes the importance of partnerships to strengthen its immunization programme. WHO and other UN agencies provide technical and financial support to the Ministry of Health in vaccine procurement, surveillance and other training, manual development and relevant quality improvement. When an assessment of the cold chain in 2008 found gaps in the system, UNICEF and Gavi, the Vaccine Alliance together supported the revamping of the cold chain. As a result, a follow-up assessment in 2011 found the cold chain to be adequate for current routine vaccines and new vaccines targeted in the cMYP (2016–2020). Currently, DPR Korea has a cold chain system with state of the art cold chain monitoring devices recommended by WHO at all levels, from the centre to the *Ri*.

Under the National Strategic Plan for Measles Elimination and Rubella Control, introduction of the measles-rubella vaccines has been planned under the coordination of international establishments such as WHO and UNICEF, so as to raise the population immunity against rubella up to the level recommended by WHO. The national action plan recommends the introduction of measles–rubella (MR) vaccine into supplementary immunization activities (SIAs) and routine immunization activities in 2019. It also promotes using the international UN and non-UN agencies operating in the health sector in DPR Korea as external monitors to enhance the accountability of activities conducted with foreign funds such as those received from Gavi, the Vaccine Alliance.

<sup>3</sup> <https://doi.org/10.1371/journal.pmed.1001929.t001>







# THE VACCINE

Although in 1757, Francis Home, a Scottish physician, demonstrated that measles is caused by an infectious agent in the blood, the first breakthrough in limiting the impact of the measles virus came nearly 200 years later. In 1954, John F. Enders and Dr Thomas C. Peebles isolated the measles virus in the blood of a 13-year-old schoolboy, David Edmonston and by 1963, the measles vaccine was licensed in the United States. In 1968, an improved measles vaccine, developed by Maurice Hilleman and his colleagues, began to be distributed. This vaccine, called the Edmonston–Enders vaccine, is usually combined with mumps and rubella and is known as the measles–mumps–rubella (MMR) vaccine.



선양과 온 사회를 김일성-김정일주의화



# LET'S PROTECT OUR PEOPLE!

## THE VACCINATION PROCESS

DPR Korea launched the EPI in the early 1980s, however, MCV1 was introduced into the country with a domestically produced vaccine in 1967. Health workers, funded and supported by the nation's leaders and through national and international partnerships, fought the battle of immunizing children aged 12 months to 16 years in four provinces with measles vaccines. Indeed, they faced challenges such as

difficult roads and terrain, unreliable energy supplies, and severe weather. But they did not give up. Finding solutions and learning from their past experiences, the health workers strengthened the vaccination process. International partnerships for funding and technical assistance, combined with efficient management of implementation at national and subnational levels showed significant improvements at all levels of the health-care structure. The country has been able to maintain national coverage at over 95% till now.

When a measles outbreak in 30 counties in 2007 was reported, the country's actions proved that it was resolute in not allowing the measles virus to retain its hold. The government acted swiftly and conducted a nationwide campaign with the support of partners such as WHO, UNICEF and others.

As DPR Korea waged its battle to defeat measles, guidelines on measles and rubella were updated and health workers trained. Currently, two doses of measles vaccine are being administered – the first dose to infants aged 9 months and the second dose at 15 months. Looking back, it is fair to say that DPR Korea has had an impressive

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*It is important to ensure high-quality immunization services, right from the moment the vials are dispatched to vaccination centres, to monitoring for AEFI, and afterwards to data entry so that we report correct coverage information.*

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**– A vaccinator**

record. There has been no report of endemic measles case in the country for more than 10 years. However, there is a need to remain vigilant against imported cases of measles, as was seen in June 2014 when three imported cases from China were reported. Swift preemptive action by the health workers ensured that patients were treated and vigil was kept to prevent the spread of the disease.

With diligent efforts, DPR Korea has been able to sustain the status of zero cases and remains alert to prevent any imported cases. So far, no sporadic incident or outbreak has been reported in any part of the country. This is indeed a commendable achievement and one that will greatly enhance the pride and prestige of the health establishment.

To further improve the programme, the country plans to replace the measles-only vaccines with two doses of the combined vaccine between 2018 and 2020.







# SECURING THE GROUND

The WHO Regional Office for South-East Asia has set 2020 as the measles elimination target for the Region. DPR Korea has already eliminated maternal and neonatal tetanus and polio. With its high immunization coverage, established surveillance system for timely detection and investigation, and an outbreak preparedness plan, the country is poised to celebrate its success in eliminating measles two years ahead of the target.

## SURVEILLANCE

Regardless of how good an immunization delivery programme may be, without strong surveillance, the metrics of the disease remain unknown. Case-based surveillance for measles and rubella started in 2006, although mandatory case reporting was only initiated the following year. In DPR Korea, the foot soldiers of surveillance are the household doctors from the *Ris*, who not only treat but also remain vigilant and investigate any illness in the community. The surveillance for measles and rubella is an active process where household doctors make daily visits to the community and actively look for any illness in the families. Cases of fever and rash are reported by the chief-of-hygiene to the household doctors who investigate them and, if required, refer to HAES for further epidemiological investigation by the anti-epidemic doctors posted there. The anti-epidemic doctors fill in the case investigation form that has around 87 variables. They collect blood samples for suspected cases and send them to the central laboratory for serology.

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*A coverage evaluation survey, conducted in 2017, showed that the coverage for all routine antigens was found to be very high. It is a commendable achievement for the country's health sector that there is no immunity gap seen for measles among people aged 1–19 years.*

**– Head, Immunological Department of the  
Central Hygienic and Anti-epidemic Institute**

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Considering the highly infectious nature of the disease, any transmission of measles would not go unnoticed under such extreme vigilance of the household doctors. In addition, a passive surveillance mechanism is also in place with constant monitoring of performance of the passive reporting sites through a weekly reporting system.

## LABORATORIES

DPR Korea has an outstanding record for laboratory surveillance, scoring 100% on all parameters consistently since 2012. It is no surprise, therefore, that the country has an accredited National Measles-Rubella Laboratory. The laboratory was first certified by WHO in 2008. Laboratory improvements were undertaken as part of the National Plan for Measles Elimination and Rubella Control. The laboratory was found to maintain its proficiency during the accreditation process in 2015 and continues to provide facilities for investigation of suspected measles and rubella cases for serology to the entire country.

Great care is taken to collect specimens from all suspected cases of measles and rubella and ensure swift and safe delivery to the National Measles and Rubella Laboratory through controlled transportation with adequate cold chain maintenance. In 2014, of the 135 suspected measles cases tested at the laboratory, three cases were found to be positive. These are the last cases of measles to have been identified in the country.







Chair of SEA Regional Verification  
Commission congratulating the Chair  
of National Verification Committee of  
DPR Korea, 2 August 2018

# CELEBRATING THE VICTORY

As the country maintains its indigenous measles-free status from 2007 and is free from any imported measles case from 2014 onwards, there is a sense of anticipation in the public health fraternity that awaits the official certification of “no endemic measles”. All that it needs is an independent “security pass” in the form of verification before it can celebrate this fact, secure in the knowledge that the measles virus had indeed been eliminated.

## VERIFICATION COMMITTEE

The National Verification Committee (NVC) for Elimination of Measles, Rubella and CRS is an independent five-member committee. Formed in June 2014, the Committee is also responsible for verification of polio. Among the first tasks that the NVC undertook in 2014 was to create a counterplan to block the spread of measles and rubella through creation of boundary quarantine. The NVC has a holistic overview of the progress of the programme in the country, monitoring population-level immunity gaps, evaluating immunization coverage in SIAs and strategizing on the strengthening of the laboratory network, among other tasks. It closely evaluates the three criteria set by WHO for elimination of the disease, namely, documentation that endemic measles, or rubella, virus transmission has been interrupted for a period of at least 36 months from the last known endemic case; the presence of a high-quality sensitive and specific surveillance system for detection; and genotyping and molecular evidence that supports the interruption of endemic transmission.

Under the watchful eye of the NVC, the Democratic People’s Republic of Korea has taken great strides towards the elimination of endemic measles. The NVC is assured and confident that DPR Korea’s immunization

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*My children’s future is now healthy, thanks to the government’s immunization initiative.*

**– A proud parent**


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programme, enhanced surveillance, capacity for early detection and response to importation of cases from neighbouring countries can keep endemic measles at bay. The NVC was therefore ready in the first half of 2018 to request the WHO Regional Verification Committee to independently evaluate the status of measles in the country.

## Closing THE door ON MEASLES

And so, at its meeting on 2 August 2018, the South-East Asia Regional Verification Commission (RVC) for Measles Elimination and Rubella/CRS Control verified that the Democratic People's Republic of Korea had indeed been successful in eliminating endemic measles, two years before the Regional goal.

This courageous nation has shown that it is capable of overcoming difficulties, focusing on its goals and striding ahead as a quick adapter in the Region, surprising its detractors and triumphing in its efforts.

A group of approximately ten people, mostly men and women in professional attire, are standing in front of a building with large windows. The image is overlaid with a dark red semi-transparent filter.

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*The elimination of measles is a hallmark in the history of public health in the country, and we are proud to have been at the forefront of the global war against measles.*

**– Chairman  
National Verification Committee**

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Genotyping and molecular  
evidence of sustained interruption  
of endemic virus transmission

History and  
epidemiology

High population  
immunity

**The 5 lines of  
evidence that  
the NVC seeks  
includes**

Sustainability of measles  
elimination in the context  
of national immunization  
programme sustainability

Epidemiologic  
surveillance  
and laboratory  
performance quality



*Today, DPR Korea can stand tall in the comity of nations as a country that has shown its mettle in meeting its commitments and fulfilling its role as the protector of its people as well as a contributor to the global health security agenda.*



# LESSONS LEARNT

Limited resources cannot hold back people's collective will when they are determined to achieve a specific goal to improve their own well-being, along the line of the national *juche* idea which highlights that man is the master of his destiny. The Democratic People's Republic of Korea provides many lessons that are worth emulating.

**Accountability leads to efficiency.** When tasks are well defined and people are held responsible for their tasks as their occupation as well as their social responsibility, efficiency is a natural outcome.

**Limited resources need not lead to compromised results.** When interventions to reach a social goal are prioritized, plans are well made and executed in a systematic manner such that each citizen in different roles contributes to the same common social goal. Through health interventions, expected gains can be ensured through timely and efficient action.

**Partnerships pay.** Understanding the roles that development partners can play and leaning on their strengths when required to bolster their own immunization programme under difficult circumstances, the country has not lagged behind the global health security agenda, contributing enthusiastically towards achieving the Sustainable Development Goals (SDGs).

**The whole is greater than the sum of its parts.** DPR Korea's system is unique in that it acts collectively. The elimination of measles demonstrated that coordination between every level of the health system and the wider administration, with involvement of people's deputies as well as the community itself, in achieving the health goals is workable and duplicable in the country. It underscored the country's national policy that no matter how well individual verticals may function, success requires all the parts of the programme to work in harmony.

**Vigilance must remain.** This success is commendable. But the country wants to protect its achievement and sustain it for years to come. The last case of measles in DPR Korea occurred in 2014. Like in many other spheres of society, the country is strengthening its systems to continue immunization activities, including reporting and surveillance. This is essential to ensure that the virus does not slip back into the community and affect the well-being of children who are the future of a nation.

# PROTECTING THE FUTURE

The measles virus survives. Hidden in the shadows, this hardy antagonist waits for the guard to be let down to slip in and spread its malaise once more. Vigil has to be maintained to hold this tiny tyrant at bay. Even when DPR Korea has been declared measles-free, the high coverage of measles vaccine must be maintained, always above 95%, but the closer to 100% coverage, the better. Hawk-eyed surveillance and continued testing of suspected cases, combined with an aggressive and well-managed response to import-related cases, are crucial in preventing the epidemic from re-emerging. The country must remain protected. Not only today, or tomorrow, but for generations to come.

Photos: © robertharding/Alamy Stock Photo

## **DPR Korea -**

The morning shines on the rivers and  
mountains of this land, free from the  
measles virus

