Integrated Disease Surveillance in Democratic People’s Republic of Korea

Report of the Joint CSR and IVD Review
15-26 September 2008
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1. Purpose of assignment

The assignment in the Democratic People’s Republic of Korea (DPR Korea) was undertaken to: conduct a systematic assessment of the national integrated disease surveillance infrastructure with special emphasis on assessing the early warning surveillance capacity, routine reporting system, data analysis, laboratory capacity, and outbreak investigation and response to identify strengths and limitations and provide recommendations and plans for improvement.

The assignment aimed to achieve the following objectives:

(1) Assess the capacity and sensitivity of the disease surveillance system to rapidly detect morbidity and mortality rates above the expected levels and mount an effective response. In this context, the integration and strengthening of measles surveillance activities after the measles catch-up campaign following the 2007 measles outbreak was also planned to be studied.

(2) Conduct a desk review of the routine integrated disease surveillance system, flow of data, data management, data analysis, feedback and response, and supervision. Assess whether the quality of information collected, and of documentation and reporting at national, province and sub-national levels was adequate for evidenced-based decision-making.

(3) Conduct site visits to hospitals or other reporting units to conduct active case searches to find missed communicable (including vaccinepreventable) diseases, Acute Flaccid Paralysis (AFP) and Adverse Events Following Immunization (AEFI) cases. Assess the training needs of health-care and surveillance staff at the peripheral level.

(4) Build capacity of country staff on integrated disease surveillance (IDS) and International Health Regulation (IHR).
(5) As laboratories are a critical element of effective disease surveillance, the coordination and communication of laboratory results with disease surveillance was planned to be assessed.

2. Current status

DPR Korea has made substantial progress in communicable disease surveillance, polio eradication, and immunization coverage. The country has historically had an extensive and comprehensive health system infrastructure. Under the overall guidance of National Health Committee of the Cabinet, the management of the health system lies with the Ministry of Public Health (MoPH)\(^1\).

Administratively, the country is divided into three main levels – central, provincial and county. The operational functions of the health care system falls into two groups – those under the MoPH and those under the control of local administrative bodies (provincial, city and county, or district People’s Committees).

Oversight or preventive health care and IDS are conducted by the Central Hygiene and Antiepidemic Institute (CHAEI) at national and provincial levels. The CHAEI has numerous sections including an information section that receives reports from provinces, epidemiology section for outbreak investigations, microbiology and virology laboratories (polio, measles, influenza, and avian influenza), and malaria, parasitology, food safety and other sections that support disease surveillance.

DPR Korea has been participating in the Regional Strategic Plan for Integrated Disease Surveillance Programme (2002-2010). An assessment in 2007 revealed that all infectious diseases were being considered for immediate notification in case of an outbreak. Regular data collection is based on immediate, weekly and monthly reports from Ri/Dong to counties to the provinces and from the provinces to the central level. According to national health authorities, case definition is available at all levels.

Nationally and provincially, the National Immunization Programme (NIP) is situated within the network of Antiepidemic Health Stations that

manage a wide range of communicable disease control programmes. Under the management of the MoPH, DPR Korea has an extensive network of more than 800 general and specialized hospitals at central, provincial and county levels, and about 1000 hospitals and 6500 polyclinics at Ri (rural county) and Dong (urban county) levels. At the grass-roots level, a household doctor (section or family doctor) provides preventive and curative health care to around 130–140 households. There are about 50 000 section doctors in the country.

In July 2001, polio-free status was confirmed through an International Acute Flaccid Paralysis (AFP) Surveillance review. Although global certification standard AFP surveillance was achieved that year (1 AFP case per 100 000 population under the age of 15 years), gaps in disease surveillance and reporting infrastructure were noted. To date, the country has yet to meet the regional target of 2 AFP cases per 100 000 population less than 15 years of age.

In April 2006, using the existing communicable disease surveillance system, DPR Korea began reporting monthly to the Regional Office on the aggregate number of vaccine-preventable diseases (VPDs) and adverse events following immunization (AEFI). Prior to this the National Measles Laboratory initiated monthly reporting of measles and rubella serology (IgM) results in 2005. Discrepancies between the number of measles cases and outbreaks investigated and reported from surveillance and laboratory continue and bring into question the strengths and limitations of the communicable disease surveillance infrastructure.

In order to give the desired thrust to the Expanded Programme on Immunization (EPI), the government of DPR Korea developed a Mid-Term Immunization Strategic Plan for DPR Korea (2007-2011) to make available the necessary resources for improving the managerial capacity of personnel involved, as well as the logistical support, coupled with appropriate research initiatives. The Multi-Year Strategic Plan (MYP) document was intended to guide those who implement the programme to provide vaccination to every child in the country, and to monitoring and strengthening the processes at all levels, thereby focusing attention on achievable goals.
3. Methodology

Disease surveillance, early detection, and response capabilities were reviewed by the team in DPR Korea to ensure that activities met the minimum international standards for disease surveillance.

Two members of the Regional Office CSR and IVD staff with expertise in IHR, policy, management and surveillance constituted the review and assessment team.

The review and assessment of the structure and function of the Integrated disease surveillance systems and response were conducted at the national level at the Central Hygiene and Antiepidemic Institute (CHAEI), National Infectious Diseases Hospital, National Polio and Measles Laboratory, as well as at the anti-epidemic stations and health institutions at central, provincial, county and Ri levels. (Annex 1)

The outcome of containment measures for the measles outbreak in 2007 and the subsequent surveillance and immunization responses were assessed.

4. Observations

Observations can be broadly categorized into central, provincial and county levels.

4.1 Observations at central level

Central Hygiene and Antiepidemic Institute (CHAEI) – Pyongyang

The surveillance system that has been established has the capacity to detect outbreaks and, within 24 hours, relay that information to the national level. Depending on the capacity the outbreak can be managed at county, province or national level e.g. measles outbreak last year.

The two types of activities that take place are:

(1) Routine reporting; and
(2) Outbreak investigations
(A) Routine reporting

Routine reporting starts from the Ri and peripheral health institutions and reports are submitted centrally to the CHAEI. There are three types of reporting: daily, 10-day and monthly reporting.

Daily reporting

The doctor who sees the patient filters the diagnosis to epidemiologically-important ones as decided at that period of time by the national level. He telephones the information centre at the next level and gives a number coding on the number of cases assigned for each code.

The codes are as follows:

Column A – Name of the province

Code

(1) Number of counties that report cases;
(2) Number of cases that occur on the same day;
(3) Number of suspected cases reported today;
(4) Number of counties that have cases;
(5) Number of current cases confirmed;
(6) Number of total current suspected cases;
(7) Cumulative number of suspected cases; and
(8) Cumulative number of confirmed cases.

- The above information is consolidated at the provincial level and then transmitted through the Central Committee to the Minister of Public Health (national level).
- Vertical systems exist for AFP/ VPD/ TB
Only selected diseases are included. Official instructions on which disease to include and which to exclude and also the case definition and the main features are sent from the capital to the field periodically.

Now the diseases that are included are measles, mumps, haemorrhagic fever, peruses and meningitis.

10-day reporting

Diseases included currently are bacillary dysentery, meningitis, pertussis, measles rubella varicella, diphtheria, mumps and haemorrhagic fever. Reporting is also done over the phone.

Information collected includes:

(1) Cumulative number of cases in 10 days;
(2) Number of current cases;
(3) Cumulative number of deaths;
(4) Cumulative number of reported cases; and
(5) Cumulative number of suspected cases.

Monthly reporting

This is applicable only to vaccine preventable diseases.

At the national level the form similar to the one used by the Regional Office is used.

At each level, the daily report and the 10-day report are compiled into a single monthly report and sent to the State Committee, which then sends it to the Minister of Public Health.

The report is then shared with WHO.

(B) Outbreak investigations

The definition of outbreak varies for different diseases; one case of a rare disease is considered an outbreak.
The Rapid Response Teams (RRTs) are available at county, provincial and central levels.

The RRT at a higher level becomes active when the request is received from the lower level.

At the central level, the RRT consists of two surveillance doctors (epidemiologists), two laboratory technicians and two clinical doctors.

At the central level RRTs visit the areas where there are important diseases to be investigated, such as cholera, Japanese Encephalitis, smallpox, hepatitis and some communicable diseases that have almost been eradicated but have the potential for epidemics none the less.

Indicators to be used for declaring an outbreak/epidemic are available for each disease and condition. Furthermore, case definitions are disseminated in the form of pamphlets that are distributed during outbreaks.

The AFP system follows a vertical programme with weekly reports and linelisting for all cases. Specific guidelines for AFP surveillance and response are available.

**Infectious Diseases Hospital, Pyongyang**

The construction of the isolation ward for avian influenza has been completed in 2007 with installation of the ventilation exhaust system.

The generator and stabilizer have been procured and will be installed by October.

The WHO Infection Control expert will visit DPR Korea at the end of October 2008 for two weeks to provide technical advice on operation of the isolation ward, and observe and advise on infection control practices for medical and nursing staff.

Current staffing: 35 medical doctors, 20 nurses and 5 pharmacists.
- It is a referral hospital for severe cases of all infectious diseases from 23 districts and counties. The hospital staff see approximately three-five patients per day.

- Surveillance data are recorded in linelisting and reported to the city Central Hygiene and Antiepidemic Institute over the phone daily, every 10 days and after every month. The registration book contains information on date, name, sex, age, occupation, address, laboratory test specimens and name of technician. After the laboratory test, the diagnosis is recorded in the log book in linelisting format.

- Diseases under surveillance notification: meningitis, dysentery, diarrhoea, malaria, rubella, mumps, varicella, typhoid, paratyphoid, influenza and poliomyelitis.

**Polio and Measles Laboratory, Pyongyang**

The functioning of the polio and measles laboratory, as well as the status of the final cases of the 2006–2007 epidemic were explored. The following were the observations:

- The tailend of the 2007 measles outbreak had no more cases reported as per the version of Dr Ri Pong Nan.

- An excel sheet with the requirements was given to the CHAEI with request for completion and they have indicated that there were no more cases after the last case reported to SEARO.

- Over 20 trainings had been provided to the AES staff of provinces;

- Measles outbreak investigation guideline had been printed in the Korean language;

- AFP surveillance guidelines were available;

- The WHO module on surveillance for VPD had been translated into Korean and distributed;
The typing results of measles virus isolation for the 2007 outbreak were not known as they were awaited. Those had been sent from the Regional Office in New Delhi to the authorities after the review.

No action on rubella surveillance. Though cases were being reported, outbreaks were not being investigated nor were the cases being followed up;

Samples from the periphery to the laboratory are not documented properly,

A second opportunity for measles vaccination has been provided through Ri for children between 15 and 18 months since 1 July 2008.

**Taedonggang District Hospital, Pyongyang City**

This hospital, established in 1960, has 300 beds, 160 doctors and 60 nurses. It handles a population of 200 000 and receives referrals from 13 dong and districts clinics. It provides services in medicine, surgery (OBGY) and paediatrics.

If the patients are found to be suffering from infectious diseases, they are referred directly to a separate Infectious diseases department. Other services are provided through specific departments. The hospital has capacity for laboratory confirmation and reports the cases to (AES) over the phone.

The diseases under surveillance include rubella, varicella, measles, pertussis, AFP haemorrhagic fever and meningitis. According to the director, the confirmed cases are investigated from the city AES. Routine reporting is done on a daily, 10-day and monthly basis as in other places. The linelisting form for 2007 had six cases of measles-The last suspected measles case was linelisted and reported in May 2008. In 2008, there were three cases of varicella. No suspected cases were linelisted.
Credits and concerns regarding the system at the central level

<table>
<thead>
<tr>
<th>Credits of the system</th>
<th>Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ There is a system that demonstrates the flow of data.</td>
<td>➢ Thresholds for outbreaks do not exist.</td>
</tr>
<tr>
<td>➢ Guidelines are available in Korean on IHR, VPD/ integrated disease surveillance and measles outbreak investigation.</td>
<td>➢ The diseases under surveillance vary from time to time and place to place.</td>
</tr>
<tr>
<td>➢ Trainings are being conducted for provinces from the CHAEI.</td>
<td>➢ Data analysis is not being done.</td>
</tr>
<tr>
<td>➢ There seems to be an integrated VPD disease surveillance manual. Since the reports are collected in a systematic manner from the periphery, there is no issue on timeliness and completeness.</td>
<td>➢ Spot maps are not available.</td>
</tr>
<tr>
<td>➢ Laboratory request forms do not contain basic epidemiological data.</td>
<td>➢ There is uncertainty at the tail-end of the measles epidemic.</td>
</tr>
<tr>
<td>➢ Laboratory linelist does not have the immunization status of children.</td>
<td>➢ Rubella outbreaks have not been identified and investigated.</td>
</tr>
<tr>
<td>➢ There is likelihood of duplication and also mismatch of data as the reports are sent/received over telephone.</td>
<td>➢ There is likelihood of duplication and also mismatch of data as the reports are sent/received over telephone.</td>
</tr>
<tr>
<td>➢ Linelist exists only for AFP.</td>
<td>➢ No surrogate indicators to monitor surveillance of other diseases.</td>
</tr>
<tr>
<td>➢ Non-polio AFP rate is less than 2.</td>
<td>➢ Acute shortage of stationary noticed.</td>
</tr>
<tr>
<td>➢ Even though coverage with OPV in RI seems to be excellent, the coverage with DPT does not match. There also are outbreaks of pertussis. This indicates vaccine supply or acceptance issues.</td>
<td>➢ There does not seem to be any feedback mechanism in the field.</td>
</tr>
</tbody>
</table>
| ➢ Forms for collecting information at the national level have eight columns, while those being used for provinces and below have five columns. |gli}
4.2 Observations at provincial level – South Phyongan province

_Provincial Hygiene and Antiepidemic Institute (PHAEI)_

The major role of the PHEAI is to set up surveillance systems from Ri to the province. The total population that handles is 3 125 512. The services are provided by 82 staff through the following departments:

1. Hygiene Control department
2. Anti-epidemic department
3. Immunization department
4. AIDS Prevention department
5. Parasitic Diseases department
6. Occupational Health department
7. Food Safety department
8. Health Education department

The surveillance doctor at the AES reports to the Provincial Health department (under the Provincial People’s Committee) on a daily, 10-day and monthly basis.

Flow of data

- The 26 counties and one provincial hospital send reports over the telephone to the province.
- Reporting is voluntary – no compulsion.
- Fixed time for calling PHEAI (two information officers who are doctors- each handling 13 stations).
- Reports include measles, pertussis, varicella and haemorrhagic fever, and are based on that are currently endemic diseases.
- The 2007 measles outbreak had 271 cases in this province, of which 23 samples were collected: 10 + ve and 13 negative.
Rapid response team

- The Rapid Response Team (RRT) includes the team leader who is the Vice Director of the PHAEI and the Director of Department of Epidemiology, Vice Director, Provincial Infection Disease Hospital, Chief Physician, Chief Laboratory Technician, Infectious Disease Hospital, Section Chief, Bacteriology laboratory, Epidemiologist i/c Infection Control PHAEI.

- The RRT was first formed in 2006 for tackling the measles epidemic.

- The RRT was trained for measles epidemic; no more trainings provided subsequently.

- Training is conducted for RRT members in three separate groups, using both standard training and local material.

- The RRT has six members: Director, Antiepidemic Station – team leader; epidemiologist; Vice Director, county-level hospital, Chief Physician, county-level hospital; Laboratory Technician, county-level hospital and Laboratory Technician, Antiepidemic Station.

Role of provincial laboratories

- Laboratory is responsible for collection of samples and performing of tests.

- Specimens are sent with basic epidemiological data – this did not match with what we saw at the provincial hospital and at the CHAEI.

- The Laboratory Report Form is the available log for laboratory maintained reverse cold chain.

- If results are ambiguous they are sent to the laboratory of the next level i.e. national level.

- Usually bacteriology, serology and agglutination are the tests done.

- Virological testing and confirmatory tests are done only at the central laboratory.
The total number of specimens is very low—probably seasonal e.g. pertussis in the spring season.

WHO testing kits had run out of stock and the laboratories were unable to function.

**Provincial Infectious Diseases Hospital**

The hospital is under Provincial Health department (MoPH). It opened four years back, with provision for 105 beds. However, it has only 50 functional beds.

**Day-to-day operations**

- There are 34 staff – 12 doctors, 6 nurses and 16 paramedical personnel.
- The hospital handles approximately 10 patients per day.
- There were no inpatients in the hospital at the time of our visit.
- During outbreak season, such as pertussis outbreaks, cases are admitted here.
- Cases get admitted if the symptoms do not subside after a week of management.
- In severe cases such as meningitis, the provincial AES is informed and a joint investigation is done. In such instances the patient is admitted and the case is notified.

**Flow of data**

- The doctor in the Registration department reports to the PHAEI.
- Outbreaks – daily reports.
- 10-day reports and monthly reports are also sent to the information over the phone between 5.30 pm to 6.00 pm.
- If phone lines are not working then a person visits the PHAEI and gives a verbal report.
Supervision

- Visits are undertaken from province to the hospital for training purposes.
- Active surveillance visits are also made from the province every month.

Role of Laboratory

- Specimen collection is made at the hospital by the laboratory technician.
- The laboratory performs basic tests such as for bacteriology, parasites and blood counts.

Credits and concerns regarding the system at the provincial level

<table>
<thead>
<tr>
<th>Credits of the system</th>
<th>Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adequate manpower.</td>
<td>Only aggregate data are collected.</td>
</tr>
<tr>
<td>Systems in place for the collection and upward transmission of data.</td>
<td>Difficult to go back to trace a particular case.</td>
</tr>
<tr>
<td>There does not seem to be issues of timeliness and completeness as most reports are received / sent over the telephone.</td>
<td>Case definitions not clear.</td>
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<tr>
<td></td>
<td>No SOPs seen for important diseases.</td>
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<tr>
<td></td>
<td>No documentation of supervisory visits.</td>
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<tr>
<td></td>
<td>Manpower seems to be excessive.</td>
</tr>
<tr>
<td></td>
<td>Trained manpower doing jobs that could be decentralized, e.g. doctor collecting data.</td>
</tr>
<tr>
<td></td>
<td>Standard manuals are not available.</td>
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<tr>
<td></td>
<td>The laboratory capacity for the province seems very inadequate.</td>
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<tr>
<td></td>
<td>Diseases under surveillance are variable.</td>
</tr>
</tbody>
</table>

4.3. Observations at the County Level

Sukchon county AES in South Phyongan province

This county provides health-care services for a population of 172 462 as per the 2007 national figures provided.
The centre covers 23 Ri and 1 Oup (Ri is rural, dong is urban and Oup is municipality). At present, the communicable disease control activities include immunization, health education, prevention of parasitic diseases, control of epidemics and sanitation and hygiene activities. The roles of the various departments are as follows:

**Immunization**
- Immunization activities is a priority.
- Training is also conducted for immunization in the community.
- Vaccine supply and vaccine effectiveness testing also take place here.

**Communicable disease control**
- The diseases under surveillance include measles, pertussis and varicella. Other diseases that get reported include mumps, rubella and avian influenza from time to time.
- AFP is sent independently on a weekly basis.
- For the recent past only zero reports were being sent as there are no communicable disease cases were reported.
- The last case of measles was reported in March 2007. Since then no cases have been observed.
- The measles outbreak in the country was first notified by the Ministry of Health and house-to-house visits revealed a large number of cases (15 noted in the linelist).
- The anti-epidemic department is responsible for the control and prevention of communicable diseases.
- The epidemiologist investigates when suspected cases are reported in the community.
- Epidemiologists are involved in the control, management and isolation of cases, and for breaking the epidemiological linkage.
- The procedure adopted is that suspected measles cases are first reported by the section doctor. The findings are then confirmed
by the epidemiologist, who along with the laboratorian undertakes a joint investigation.

- Blood samples are collected and sent to the CHAEI for confirmation.
- Samples are collected only from a few cases. Other cases are epilinked to the confirmed cases.
- The linelist showed that no cases had been picked up from home consultation or from OPDs; this was because from national level, it had been promoted to isolate the patients.
- The linelist was transmitted over the telephone. Later, a hard copy was handed over to provinces.
- There is a common linelist for all diseases.
- There is a template for data analysis as well.
- Health education material from the top level is disseminated to the general population for prevention of communicable diseases.

Sanitation and hygiene

- Responsible for monitoring the drinking water quality, disinfection of drinking water and water-quality testing.
- Also responsible for environment.
- The Parasitic Disease department prevents the occurrence of parasitic diseases.

Flow of information and supervision

- The information section collects information from Rī and Dong levels and transmits it to the province.
- Doctors supervise by personally visiting the field to see if the stipulated activities have been completed or not.
**Rapid Response Team (RRT)**

The rapid response team consists of

- Team leader – director of the Antiepidemic Station;
- Epidemiologist – County Antiepidemic Station;
- Laboratory technician – County Antiepidemic Station;
- Vice director county hospital;
- Doctor i/c of the isolation ward of the county hospital; and
- Laboratory technician of the county hospital.

The agriculture department has its own Antiepidemic Station (AES). During emergencies, the veterinary AES and the medical AES coordinate closely. They are aware of the potential of an Avian influenza outbreak because of the migratory birds in their county.

**County Antiepidemic Station (AES), Pyongsong city in South Phyongang province**

This county covers a total population is 518,871. There are 21 dongs and 11 Rōis under this AES. There are three departments: Hygiene; Antiepidemic and Parasitic Disease Prevention. It also has an immunization section.

- All communicable diseases should be reported. Recently, however, there were zero reports as no communicable diseases were reported. The last case was that of pertussis, reported last year.
- The diseases under surveillance included measles, pertussis, malaria and varicella.
- Because of lack of stationary, forms are filled up in pencil.

**The Expanded Programme on Immunization (EPI)**

- Vaccines from national store are sent to the city medical warehouse where they are stored.
The AES collects data on targeted children from each dong and Ri and places order for vaccines from the warehouse.

Vaccines are collected from the warehouse on the sixth of every month, kept in an ice box and then distributed the following week to the clinic immunization doctor after health education and training have been conducted (including AEFI) for doctors, using the standard training material.

The immunization doctor vaccinates patients and the balance vials are directly returned to the warehouse.

Stocks-out position was not noticed during the survey.

Vaccine coverage is very good – almost 100%.

The quality of vaccines is checked by the Vaccine Vial Monitor (VVM), based on the expiry dates shown on the vials.

The provincial doctors have been trained on the immunization programme.

City Rapid Response Team (RRT)

Team leader: Director, City Antiepidemic Station (AES)

Members:

- Epidemiologist, City AES
- Lab technician, City AES
- Vice Director, City Hospital
- Director i/c, Isolation Ward, City Hospital
- Laboratory Technician, City Hospital

Ri at Pyongsong city in South Phyongang province

There are 25 dongs in the city. This Ri covers a population of 12,400 comprising 3860 households.
Section doctor system

The section doctor system works at the Ri level. There are 38 doctors working here, of whom 32 are sector doctors. There also are a physician; two nurses, two pharmacists and one dentist who provide medical care and control communicable diseases.

- Sector doctors go from house to house every day, enquiring if anyone is suffering from any diseases.
- They cover 130 houses, alternating with a community health volunteer, covering 65 houses each day.
- They carry a stethoscope, blood pressure apparatus, thermometer, basic medicines, acupuncture kit and other traditional medicines.
- They also carry a household log to register all persons in the household.
- Doctors operate in the office in the day time and take turns to visit households.
- They spend time with households, depending on the seriousness of the illness/complaints.
- If a family member is not at home at the time of the visit, his/her absence is noted down for community volunteer to visit subsequently on the same day.
- Minor ailments are treated on the spot. Complicated cases are referred.
- The Chief Section Doctor is confident that sector doctors being generalists will diagnose correctly.
- All clinical diagnoses are made and confirmed by sector doctors.
- Because of their visits, not many patients visit OPDs.
- Sector doctors are also responsible for vaccination.
Surveillance system

- The household log is reviewed on a daily basis and the morbidity information based on the current disease under surveillance is sent up to the city level.
- If a suspected case is detected, it is referred to the clinic where the suspicion is confirmed and the case reported to the AES.
- Symptoms of communicable diseases (fever with rash, chest symptomatics, and diarrhoea, etc) and noncommunicable diseases are under surveillance.
- Number of cases of communicable disease has been reported for 2008.

EPI programme

- Vaccines required for one month are collected by the Chief Section/ Immunization doctor on the sixth day of every month. They are stored in a cold box.
- Next day, all sector doctors are called in and trained. The day following the training, sector doctors conduct vaccination.
- Vaccination is usually conducted at the clinic, but if there are some problems then the sector doctor vaccinates at home.
- Doctors are aware of the AEFI, but have not come across a single case.
- Immunization cards for all children are available at the centre.
- Doctors have run out of UNICEF immunization cards and are using locally prepared cards.

Traditional medicine

It accounts for 70–80% of total health care provided. The details are really hazy as the nomenclature is different.
**Credits and concerns regarding the system at the county and Ri level**

<table>
<thead>
<tr>
<th>Credits of the system</th>
<th>Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>‣ The system is excellent in terms of availability, acceptability and affordability (free service).</td>
<td>‣ The city of Pyongsong with a population of over 500 000 has not picked up a single case of fever with rash since April 2007.</td>
</tr>
<tr>
<td>‣ Not a single family member is missed.</td>
<td>‣ Case definitions, outbreak definitions and thresholds for various diseases are yet to be standardized.</td>
</tr>
<tr>
<td>‣ The immunization coverage is probably accurate as there is one-to-one contact between doctors of the health system and beneficiaries.</td>
<td>‣ Aggregate data are reported, based on local priorities.</td>
</tr>
<tr>
<td>‣ The immunization documentation system is good – the registers and cards are well maintained.</td>
<td>‣ If there is an outbreak of a syndrome/clinically confirmed cases, this will not be reported unless an alert is issued from the national level, as it happened during the measles outbreak in 2006-2007.</td>
</tr>
<tr>
<td>‣ There seems to be a system for reporting AEFI. However not a single case has been reported so far.</td>
<td>‣ The system is unable to provide information on general morbidity.</td>
</tr>
<tr>
<td></td>
<td>‣ The government encourages and promotes the traditional system of medicine. About 70-80% patients seek health care from traditional doctors. These doctors have basic medical degrees and later specialize in traditional system of health care.</td>
</tr>
</tbody>
</table>
5. Major gaps identified

5.1 General surveillance

- Only aggregate data are collected. It is therefore difficult to trace the events back to cases. Linelist exists only for AFP.
- Diseases under surveillance vary from time to time and from place to place. Case definitions, outbreak definitions for various diseases and SOP are yet to be standardized. Thresholds of outbreaks do not exist.
- Forms for collecting data at the central level do not match with the forms at lower levels. There is a likelihood of duplication and also mismatch of data as the reports are sent/received over the telephone.
- Data analysis and spot mapping are not being done at all levels. The system is unable to provide information on general morbidity.
- There does not seem to be any feedback mechanism. There is no documentation or evidence of supervisory visits.
- Standard surveillance manuals are inadequate and are not available at different levels.
- The non-polio AFP rate is less than 2.

5.2 Measles surveillance and outbreak investigation gaps

- Aggregate measles surveillance data collection is still being followed even though the incidence is very low.
- There is uncertainty regarding the tailend of the 2006-2007 measles epidemic. Not a single case of suspected measles has been reported in 2008.
- Rubella outbreaks are not being identified and investigated.

5.3 Gaps in laboratory functioning

- The laboratory request forms (except for AFP) do not contain the basic epidemiological data.
- The laboratory capacity for the provincial level and below seems to be very inadequate. There is shortage of equipments and reagents.
5.4 Miscellaneous gaps

- Acute shortage of stationary noticed at all levels. There was unconfirmed information that fuel and transport are problems leading to unusual delays in shipment of supplies. Communication takes place only through telephone.

- Coverage with OPV in routine immunization is excellent. However the coverage with DPT does not match the OPV coverage. Outbreaks of pertussis have also been reported. This indicates vaccine supply or acceptance issues. It seems that AEFI reporting is not taking place.

- In case of an outbreak of a syndrome/clinically-confirmed cases, it will not be reported unless an alert is issued from the national level, as it happened during the measles outbreak in 2006-2007.

6. Suggestions/recommendations

The following suggestions/recommendations were made based on:

6.1 Findings of the review team and

6.2 Feedback from participants of group discussions held during the two-day workshop on surveillance and IHR.

6.1 Suggestions/recommendations based on the findings of the review team

General surveillance

- The country should develop a three-year plan for resource mobilization to strengthen integrated disease surveillance based on two day workshop groupwork recommendations

- Case-based surveillance needs to be started with fixed conditions/syndromes. Linelists for VPDs and other communicable diseases need to be maintained. These have to be consolidated at different levels to produce national linelists for various diseases.
There needs to be a standard set of diseases that are under surveillance at all times. Guidelines need to be created for integrated (including VPD) disease surveillance.

Forms for data collection need to be standardized at all levels. A simple, effective way of transmitting case-based data, in addition to routine reporting over telephone, needs to be developed with available resources.

Training on surveillance standards and data analysis that is both generic and disease-specific, needs to be imparted. Interpretation and response mechanism need to be instituted at all levels. General morbidity should also be analysed and documented.

Feedback to the reporting source and supervisory visits to the county and lower levels need to be undertaken periodically and documented.

Standard surveillance manuals should be made available at all levels. WHO should share recent manuals with the country if internet access is difficult.

**Measles surveillance and outbreak investigation**

Case-based measles surveillance should be started on priority using the guidelines provided during the workshop.

A measles surrogate indicator (similar to AFP surveillance) needs to be established at national level with targets fixed for provinces and counties.

Outbreak investigations for rubella need to be institutionalized.

**Laboratory**

Standard laboratory request forms need to be used.

Laboratory capacity needs to be strengthened at least up to the province level.
**Miscellaneous**

- Logistic support for surveillance needs to be provided. The absence of internet facility in the country needs to be considered if computerization is contemplated.
- Country’s national delegates need to be encouraged to participate in regional activities aimed at updating progress and developing new guidelines and tools.

**At the WHO country office level**

**Short term**

- Follow up the implementation of the mid-term immunization strategic plan of DPR Korea with concerned stakeholders.
- The national IHR action plan should be completed.
- Follow up on the operationalization of the isolation ward for AI at the Infectious Diseases Hospital.
- A national workshop on IDSP / VPD should be organized by the first quarter of 2009.
- MoPH should be supported to immediately start case-based measles surveillance aimed at acquiring certification for measles elimination.
- Ensure syndromic reporting of AFP to enable the country achieve the regional target of < 2 non-polio AFP rate for 100,000 under 15 population.

**Medium term**

Assist the country MoPH to develop a three year integrated disease (including VPD) surveillance plan of action based on the feedback received from the two day workshop held on 22-23 September 2008.

**Long-Term goal**

- Develop a robust model of the Integrated Disease (including VPD) Surveillance system for DPR Korea.
6.2 Recommendations based on the feedback received from participants of group discussions held during the two-day workshop on surveillance and IHR (Refer to Annex 3)

7. Summary and conclusions

The following are the conclusions;

(1) The surveillance system in DPR Korea is functional and is quite effective, however, it is not efficient.

(2) The system is presently collecting aggregate data that are insufficient to maintain basic surveillance standards to detect outbreaks.

(3) The quality of information gathered and its application as information for action is questionable.

(4) Although the infrastructure exists, the surveillance system needs to be strengthened in terms of number of diseases, standard format of reporting, notification mechanism of cases, collation, compilation, analysis, interpretation and feedback mechanism.
Annex 1

Programme, list of participants and recommendations
Workshop held on 22–23 September 2008

a. Workshop on “Integrated Disease Surveillance”

**Programme:**
- **AM**  Event management system under IHR (2005)
-  Measles surveillance
-  AFP surveillance
- **PM**  Early warning system (EWARS)
-  Group discussion for plan of action and requirement for 2008-2009 based on Country Mid-term Strategy on EPI

List of participants

**Day 1**

<table>
<thead>
<tr>
<th>No.</th>
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9. Dr Hwang Mun Sop  
   Chief Laboratory Technician, Antiepidemic section, CHAES

10. Dr Ri Un Hui  
    Laboratory Technician, Antiepidemic section, CHAES

11. Dr Hwang Hye Gyong  
    Laboratory Technician, Antiepidemic section, CHAES

12. Dr Kim Nam Hyok  
    Doctor, AIDS Prevention section, CHAES

13. Dr Sin Tong Yun  
    Chief, National Polio Laboratory, CHAES

14. Dr Choe Sun Bom  
    Virologist, NPL, CHAES

15. Dr O Chol Su  
    National AFP Surveillance Officer, NPL, CHAES

16. Dr Pak Yong Chol  
    Laboratory Technician, NPL, CHAES

17. Dr Kim Chang Man  
    Epidemiologist, NPL, CHAES

18. Dr Jang In Sik  
    Doctor, Information section, CHAES

19. Dr Kim Chol Su  
    Section-Chief, Immunization section, CHAES

20. Dr Ko Gyong Jin  
    Chief, Quarantine section, CHAES

21. Dr Pang Song Il  
    EPI Doctor, Immunization section, CHAES

22. Dr Choe Jun Hyok  
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23. Dr Ri Un Hyang  
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24. Dr Ri Kwang Chol  
    Chief, Antiepidemic section, Pyongyang City HAES

25. Dr Ho Chol Min  
    AFP Surveillance Officer, Pyongyang City, HAES

26. Dr Kim Tong Hyok  
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27. Dr Ri Son Hui  
    Doctor, AIDS Prevention section, CHAES

28. Dr Song Sol Hyon  
    Doctor, Population centre, MoPH
Recommendations on the Mid Term Immunization Strategic Plan – DPRK 2007–2011 based on feedback from the surveillance workshop.

Group 1: Goal 2: To contribute to global polio eradication, measles mortality reduction and neonatal tetanus elimination

- Health education of the community through mass media.
- Training of health workers who are involved in vaccination activity.
- To increase AFP rate the strengthening active surveillance system including reporting system by computer network.
- To maintain high coverage of TT ensure timeliness of collection of target population for the vaccination.
- To maintain high coverage of measles vaccination additional cold chain equipment and transport should be provided.
- Diagnostic reagents and consumables for sero testing. Training for sero testing.

Group 2: Goal 6: To monitor and use accurate, complete and timely data on vaccine-preventable diseases, Adverse Event Following Immunization (AEFI), antigen coverage and dropout rates by counties

- Revised update of surveillance SOPs and reporting formats and reporting by phone call should be followed by hard copy of report.
- At county level, training courses for lab technicians in order to strengthen their capacity along with provision of lab materials.
- Periodic training course for epidemiologists on surveillance and reporting system for VPD at all levels.
- Training course on AEFI including correct practice of vaccination and Model demonstrating the AEFI surveillance activity
- Strengthening of existing surveillance system according to WHO guidelines which has been translated already into Korean.
- Development and distribution of revised guidelines for surveillance activities and develop Standardized format for the reporting system as recommended by WHO.
Group 3: Goal 7: Strengthen the integration of EPI with the overall health system

- Setting up of national public health laboratory, establishment of lab quality control at all levels.
- System for collection and transportation of specimens against all CDVs.
- Use of WHO Guidelines for the development of curriculum for local training courses.
Workshop on “IHR (2005) Implementation”

Program: AM  Overview of IHR (2005)
Progress of IHR implementation in SEAR
Case study: IHR implementation in Myanmar

PM  Case study: IHR implementation in Thailand
Group discussion: proposed national action plan in 2008-09

List of participants

Day 2

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Recommendations for 2008–2009 implementation based on feedback from participants of the group discussions in workshop on IHR

Group 1: IHR

- Establish IHR working group consisting of MoPH, ministry of agriculture and agencies concerned at central level.
- Develop National IHR work plan with the health authorities and partners and complete this by June 2009.
- An integrated guide to keep the health ministry and other ministries such as agriculture ministry on IHR on its implementation.
- Develop IHR training module and incorporate into existing training of field epidemiology, RRT at central and local level.
- Expand lab capacity from central lab to the other 3 provinces for sero tests of communicable diseases to support outbreak investigations.
- Establish network of communication to share information with countries such as Russia and China.
- Conduct active surveillance for diseases like polio and measles that can be eradicated.
- Govt to establish stockpile for 1 week for PPE and anti viral drugs.
- Isolation ward in 3 provinces and major port of entries (approx 15).
- Specimens collection kits, cold chain, transport facilities such as van or motorcycle.

Group 2: Surveillance system and Points of entry

A. Surveillance system

- Establish surveillance system involving several inter-sectoral areas such as veterinary, NGOs etc.
- Website to share information with other international agencies/organizations.
Unified surveillance forms – keeping forms as per the WHO recommendations – time frame 2 years

Strengthen the RRT by
- Regular national workshops/ consultations with WHO
- National training module
- Local workshops on surveillance at sub national level

Update NIPPP.

Update action plan based on collection/ analysis of reported data and report findings to lower levels

B. Points of entry

Update national law on regulating port health as per new IHR. Suggest consultation with local lawyer

There is lack of understanding about the new IHR. One needs to practice for it eg issue of vaccination certificates

Capacity building of port health officials according to new IHR requirements including Lab capacity to enhance communicable disease surveillance.

Infrastructure of quarantine office such as improving facilities, transport of patients and sanitation.
Annex 2

**Mid-term immunization strategic plan: DPR KOREA (2007-2011)**

Selected objectives, indicators, target and strategies in relation to surveillance

<table>
<thead>
<tr>
<th>Goal</th>
<th>Objectives</th>
<th>Key indicators</th>
<th>Target</th>
<th>Strategies</th>
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<tbody>
<tr>
<td>2.1 To achieve polio eradication certification by 2007</td>
<td>Number of wild polio cases</td>
<td>No wild polio cases</td>
<td>Strengthening routine immunization delivery system (goal 1, objective 1.1) quality AFP surveillance</td>
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<tr>
<td>2.2 To eliminate neonatal tetanus</td>
<td>% of counties with over 90% TT2+ coverage for pregnant women</td>
<td>100%</td>
<td>Strengthening routine immunization delivery system (goal 1, objective 1.1) quality surveillance and data analysis, safe delivery practice, SIAs in outbreak region</td>
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<td>2.3 To maintain the status of measles eradication</td>
<td>% of counties with measles coverage of at least 90% per year</td>
<td>100%</td>
<td>Situational analysis, strengthen routine immunization delivery system (goal 1, objective 1.1), strengthening surveillance, management of case with rash and laboratory capacity, and consider applying global strategies</td>
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<td>2.4 To achieve and maintain a level of 98% coverage with vitamin A supplementation to children under five</td>
<td>% of counties with 98% coverage of vitamin A supplements each year for children 6-59 months</td>
<td>100%</td>
<td>Strengthen routine immunization delivery system (goal 1, objective 1.1), adequate training for EPI staff, organizing SIAs for the areas with &lt;70% seropositive rate following the immunization</td>
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<td>6. To monitor and use accurate, complete and timely data on vaccine-preventable diseases, AEFIs, antigen coverage and dropout rates by counties</td>
<td>6.1 To institutionalize surveillance for vaccine-preventable diseases and early detection of any outbreaks</td>
<td>% of monthly VPD surveillance reports received from counties, which are complete and timely</td>
<td>&gt;90%</td>
<td>Phased introduction of RIMS, increased accuracy and use of data at local levels, and community involvement, strengthened laboratory capacity at all levels</td>
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<td>6.2 To strengthen vaccine quality and injection safety by developing a monitoring system for reporting and responding to AEFIs by 2009</td>
<td>% of counties reporting AEFI status to the province on monthly basis</td>
<td>100%</td>
<td>Provide training in AEFI SOPs and standardize reporting methods along with establishing response mechanisms</td>
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<td></td>
<td>6.3 To establish an effective, efficient, complete and timely immunization recording and local area monitoring system by 2009</td>
<td>% of complete and timely monitoring reports received from counties</td>
<td>100%</td>
<td>Increased use of monitoring tools at local level, supportive supervisory practices, prioritization of Ris and counties and phased introduction of RIMS</td>
</tr>
<tr>
<td>7. Strengthen the integration of EPI with the overall health system</td>
<td>7.1 Develop an integrated disease surveillance systems</td>
<td>% counties reporting in a timely &amp; complete manner on 3 main vaccine preventable diseases (Polio, measles and tetanus)</td>
<td>100%</td>
<td>Develop guidelines for integrated surveillance, Streamline the surveillance and reporting form for other VPDs, Organize training course to build capacity for surveillance activities; Build up on the experience acquired during the AFP surveillance; Provide incentives to those that are good at surveillance and specimen transportation; Strengthen laboratories and lab confirmations at central levels for the testing of measles and TT.</td>
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<td>7.2 Development of integrated planning systems</td>
<td>% counties that describe a package of services to be delivered in an integrated micro-plan EPI Plan is integrated into health sector plan</td>
<td>100%</td>
<td>Develop guidelines on programme planning processes, Central and provincial level experts on planning should visit counties to build capacity in integrated planning; (3) Joint review between the planners and implementers on the developed plans; Estimate the cost effectiveness and affordability of developed plans and integrated into the overall sectoral plan.</td>
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<tr>
<td>7.3 Strengthen national coordination mechanisms between EPI and the national health system and relevant Ministries</td>
<td>% counties that describe a package of services to be delivered in an integrated micro-plan</td>
<td>100%</td>
<td>Ensure the good coordination and linkages between the departments of the MOPH; Link EPI with IMCI and MCH programs; Strengthen the collaboration with civil society as well as other Ministries, Stimulate the collaboration and linkages with the volunteers, merge the Vitamin A and Deworming campaigns into EPI</td>
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</table>
This report summarized activities undertaken in DPRK to conduct a systematic assessment of national integrated disease surveillance system. It emphasized on assessment of the early warning capacity, routine reporting system, data analysis, laboratory capacity and outbreak investigation and response. It identified strengths and limitations with recommendations and plans for improvement. This review was a joint effort between CSR and IVD of WHO Regional Office for South-East Asia.