Annual Health Report, DPR Korea 2017

Ministry of Public Health

Juche 107(2018)

Preface

Health sector, in DPR Korea where construction of the socialist civilized and powerful nation is being actively facilitated, is given top priority in order to ensure the healthy life of the people as well as to promote their well-being.

Year 2016 was not only the first year for implementation of Five-Year Strategic Plan for Health Development in DPR Korea, but at the same time, the first year to initiate the activities for achievement of ambitious Sustainble Development Goal targeting by 2030 which was adopted in UN General Assemably in September, 2015 as a main global concern.

Although with complicated and knotty situation, the Government has brought remarkable improvement in the level of many health-related indicators including life expectancy, infant mortality rate, maternal mortality rate and communicable disease prevention rate by focusing on health sector, thus greatly contributing to achievement towards Millenium Development Goals.

Making publishing and delivering a comprehensive report on health status of the country are very important in the development of health sector and it also contributes towards enhancing international collaboration and exchange in health sector.

This report was written according to the national collaborative work plan with WHO.

The report described the current situation, level of improvement in health sector, and further prospective, enlightening the health statistical data during 2015-2016. In particular, progress indicators and expected outcome of maternal and children's health as one of key aspects involved in the Millenium Development Goals were analyzed and described.

We acknowledge with gratitude the dedicated support and assistance from many officials of health sector, Central Bureau of Statistics and relevant sectors, and financial support from WHO country office of DPRK for production of the report.

October, Juche106 (2017)

Contents

1. Socioeconomic Status

DPR Korea is geographically situated in the north eastern part of Asia, being 123,138 ㎢ in her area. More than 80% of its territory is mountainous while cultivable land accounts for 17%. The annual average temperature ranges between 8° to 12° and the annual average rainfall is about 1,000-1,200mm.

Pyongyang is the capital of DPR Korea and the entire country is divided into nine provinces and 3 municipalities and provinces are divided into 210 cities(districts)/counties. Counties are further subdivided into more than 4,300 of smaller administrative units, called ri, up, ku and dong.

The population of DPR Korea was 25,030,070 with the sex ratio at 95.2 males to 100 females, and the population density was 217 per square kilometers in early 2016. Population under 15 was 20.6% while population over 60 was recorded 13.6% of total population in early 2016. During the past decade, the population was annually increased by 0.52% on average and total increase was 1,274,000. The crude birth rate was 13.74 per 1,000 population while the crude death rate was 8.33 per 1,000 population in 2015, with 5.41 per 1,000 population of natural increase rate of the population. The total fertility rate in 2015 was 1.87 which was slightly less compared to the previous year, being maintained between 1.9 and 2.0 which was similar to replacement level in recent 10 years.

The proportion of urban population is about 61%, which is considered high level globally. The recent characteristics of urbanization in DPR Korea are regular increase of urban population and the even distribution of almost of medium and small-sized cities throughout the country with a few large cities (only Pyongyang has more than one million of population).

In recent years, the economy of DPR Korea has developed rapidly, overcoming the economic crisis in 1990s. The economic situation in 1990s is well reflected in the fact that gross domestic product (GDP) per capita dropped from USD 991 in 1993 to USD 463 in 2000 which was less than half of that in 1993. The period of 2000-2004 witnessed a turnaround with the annual increase in GDP per capita by 4.9% on average; thereby USD 545 was achieved in 2004. Then it reached to USD 683 in 2007 with the annual growth of 7.8% during 2004-2007. Such economic growth rate has been maintained afterwards (6.3% annually), therefore GDP per capita was increased to USD 798 in 2009, USD 904 in 2011, USD 1,024 in 2013 and USD 1,053 in 2014.

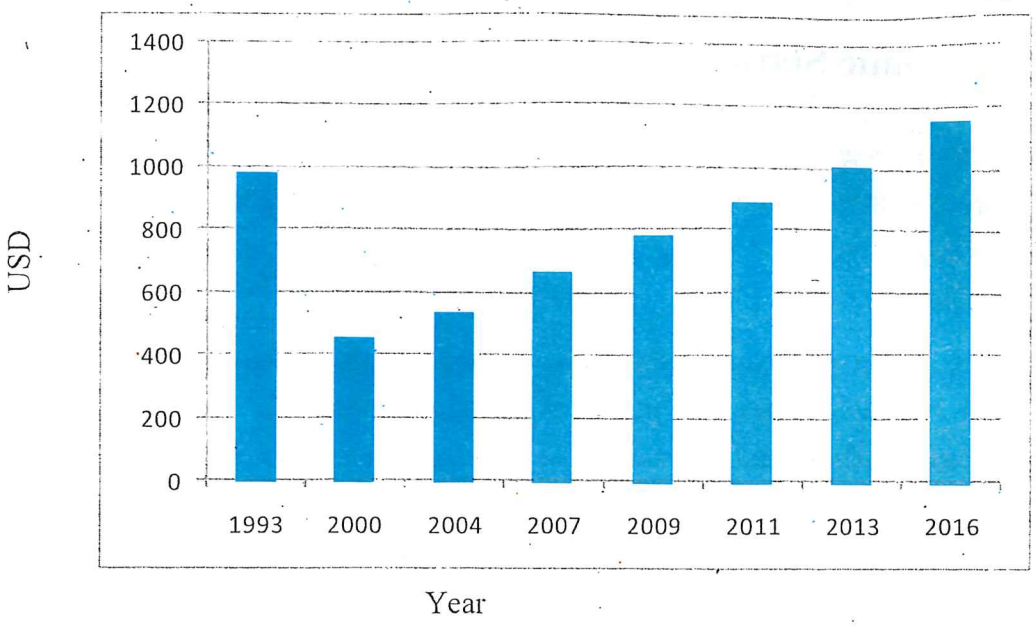


Figure 1. Gross Domestic Product per capita during 1993-2016

In particular, the struggling for creating the Manlima Speed has been under way with unabated vigor in the economic sector with the mighty of single-hearted unity, self-supported power and science and technology despite of the worst inhuman and evil blockade to stamp out our rights to live and develop imposed by the US and its vassal forces against the national economy without any parallel in the world.

Targeting for basis of sustainable development of the state economy by activating the whole people's economy and keeping the balance between the sectors of economy, pushing ahead of implementation of five-year strategic plan for economic development on a full scale made more enforcement of independent foundation of the whole economy including the main stem industry like electric power, coal, metal and railway and transport industry, and mechanic and chemical industries as well as maintenance of production at high level and creating of world-startling miracles in the field of construction.

Also, in the field of agriculture, the scientific and intensive level of farming has been remarkably improved, providing the foundation for foodstaff self-sufficiency.

In addition, every sector of the country's economy is leaping up to knowledge-based economy based on the rapid development of advanced science and technology including information technology, nano-size technology, bioengineering, space technology and nuclear technology.

There is no unemployed person in DPR Korea as of 2016, thanks to the government's initiatives to provide all the working aged people with the appropriate jobs and enabled environment for work when they are 17 years old.

With the rapid development of the national economy and expansion of various economic sectors, demand for workforce is continuously growing and the government is striving to provide the people with more-suitable jobs.

Table 1.1 shows the labour participation status of the male population in age of 15-59 years and female population in age of 15-54 years resulted from TB prevalence rate survey 2015-2016. As shown in the table, proportion of students, persons staying at home or retired are approximately 10% and 15%, respectively. Men who stay at home is 3.1%, meaning that about 97% of men have the jobs.

Table 1.1 Occupational proportion by sex (%)

	Student	Officer	Worker	Farmer	Sportsman	Stay at home, retired
15~59 (Male)	11.7	13.9	44.3	27.0	0.05	3.1
15~54 (Female)	8.3	10.8	29.5	25.6	0.02	25.8
Total	9.9	12.3	36.6	26.3	0.04	14.9

The universal, free and compulsory education system of DPR Korea has a history of over 50 years. Illiteracy was completely abolished even before 1950, thus the adult literacy rate is 100% at present.

The universal compulsory education system of the country has undergone the development steps from primary education, through secondary education, 9-year technical education, and 10-year secondary education to the enforcement of 11-year universal compulsory education in 1972 and 12-year one in 2013 ultimately.

The schools system has been changed accordingly and schools are evenly distributed at a distance of almost 2 kilometers. Schools exist in each block in the cities and each ri in rural areas. Even in the mines, forestry worker's villages and light house islets where there are only several students, branch schools are established with dedicated teachers and shuttle services for students are provided by trains, buses, boats and cars.

There are also special schools for differently disabled children including the ones for blind, deaf and dumb. Education policy ensures that teachers visit and educate children who are unable to attend the school in their compulsory schooling period, thus overall enrollment in primary and secondary education is reaching over 98%. Hence, the level of general knowledge and education in adult population is considerably high.

Table 1.2 shows the level of education of respondents (in age of 15 and over) to TB prevalence rate survey which was conducted in 2015-2016.

Table 1.2 Level of education by sex(%)

	Students	Graduated the middle school	Graduated the college	Graduated the university
Male	10.2	59.3	10.1	20.4
Female	6.4	71.6	11.4	10.6
Total	8.1	66.1	10.8	15.0

As shown in table, the respondents who graduated the middle school and college are 92% and 25.8%, respectively. The proportion of male respondents who graduated the university is 20.4%, higher than 2 times compared with female (10.6%).

The proportion of student respondents among the population in age of 15 and over is 8.1%; 10.2% for male and 6.4% for female, meaning that 100% of respondents are students or have the educational history of middle school or higher level.

Aiming to make the state full of talents and all the people well versed in science and technology, the country is striving to develop its regular educational network consisted of educational facilities from primary to tertiary levels as well as genius education system for students of special talents and continued education system, and to provide a good educational environment where everybody can learn including distance educational system.

2. Trend of Health Policy Development

2.1 Trend of Health Policy Development

The man-centered Juche philosophy and the idea of independence, self-sufficiency and self-defense created by the Great Leader Comrade **Kim Il Sung** and developed and fertilized by the Great Leader Comrade **Kim Jong Il** are the starting points for developing national policies, and based on that, all the laws and regulations have been adopted and implemented. The policy basis for development of the health sector of the country is also the man-centered Juche philosophy.

Upholding the health as the fundamental human right, the Government guarantees, by its policy and law, to protect and take care of life and health of people in DPR Korea. It is also indicated that the lives and health of mothers and children shall be specially protected and promoted through granting maternity leave, shortening working hours for mothers having several children, scaling up the network of maternity hospitals, nurseries and kindergartens and pursuing other several policies. In this regard, duration of maternity leave for women is lengthened systematically from 150 days to 240 days in 2015 which is 90 days more than before.

The representative laws on health and well-being of the people are the "The Socialist Constitution of DPR Korea" (declared in 1972, underwent revision several times and last revision was made in 2016) and the "Law on Public Health, DPR Korea" adopted in April 1980.

Others including the "Law on Nursing and Upbringing of Children, DPR Korea", the "Law on Prevention of Communicable Diseases, DPR Korea", the "Law on Food Safety, DPR Korea", the "Law on Public Hygiene and Sanitation, DPR Korea", the "Law on Medical Treatment, DPR Korea", the "Law on Management of Medical supplies, DPR Korea", the "Law on Environment Protection, DPR Korea", the "Family Law, DPR Korea", the "Law on Tobacco Control, DPR Korea", the "Law on Education, DPR Korea", the "Law on Protection of Disabled People, DPR Korea"(revised in 2015) and the "Law on Management of Narcotic Medicines, DPR Korea" also legally guarantee the developments in different fields of public health.

The national health policies give directions for ensuring that all the people can equally enjoy maximum benefits of health. At the core of the public health policy in DPR Korea is the directive to realize and adopt preventive medicine in all health activities and to strengthen the comprehensive and universal free medical care system.

The origin of preventive medicine and free medical care, the core of public health in DPR Korea was developed by the Great Leader Comrade **Kim Il Sung** already in 1930s.

The free medical care system based on social security scheme was enforced in January 1947, and then universal free medical care system was declared by the State decree in 1952, amidst Fatherland Liberation War, and enforced since January 1st in 1953. As for the universal free medical care system, it has been developed continuously since its initiation in April 1960.

At the time of construction of socialist system in early 1960s, the socialist medicine was defined as preventive medicine and thus, preventive medicine and free medical care have been served as a basis of health policies of the government. Also, the devotion of health workers to the health care services for people is defined as the property and the lifeline of socialist public health. The public health affair for protecting and improving the life and health of people is one of the top priority issues in national policies.

Typical examples are the polices on developing public health by enhancing the social interest, the state assistance and community participation in public health, gradually increasing commitment to financing for the health sector, in particular, providing the health facilities with main and subsidiary food, water and electricity as top priority, prohibiting development projects, though important, when they pose risks to life and health of people.

These popular health policies and public health system were the key factors in raising almost all the health indicators including the life expectancy and infant mortality rate up to globally advanced level by the early 1990s.

However, severe natural calamities that continued from the mid 1990s, persistent economic blockade imposed by the US and its vassal forces and the breakdown of the socialist market has negatively affected the country's socioeconomic progress and public health.

They have caused lots of damage to achievements in health care and welfare services, in the form of malnutrition, communicable diseases incidence and high mortality rates, which were inconceivable in the past.

In recent years, the situation in public health sector has been improved rapidly. The national policy stressing the development of science and technology as the principal strategy in building a socialist powerful nation has been implemented in public health sector as well, thereby medical science and technology has rapidly developed, based on that, model health facilities including Okryu Children's Hospital, Ryugyong Dental Hospital, Ryugyong Ophthalmologic General Hospital, Breast Cancer Institute and Health Oxygen Factory have been created and all the health facilities throughout the country have been renovated in modern style.

The State attaches much importance to the role of public health in building of a civilized socialist nation. Improving the hygienic and anti-epidemic work and section doctor system further, giving priority to protection of maternal and child health, improving the quality of health care, developing medical science and technology rapidly, converting the public health

sector into a more information oriented one, sufficiently producing and providing the efficient medicines, advanced medical equipments and devices and medical consumables by modernizing the pharmaceutical factories and medical equipments factories, equipping the county people's hospitals as the main center for health care service in the region, substantially supporting the ri people's hospitals and clinics, and bringing the advantages of socialist public health system including the free medical care system, have been the key tasks in public health in DPR Korea.

2.2 Other Social Policies Related to Health

The government of DPR Korea holds it as a fundamental principle for its activities to provide the people with favorable hygienic and cultural conditions and environment for their healthy, independent and creative life and makes consistent efforts to prevent disorganized socio-economic activities and migrating population which are considered as the major causes of environmental destruction.

The government instituted spring and autumn clean-up months, a month of general mobilization for land management, a month of planting trees and a month of movement for accident prevention, and staged various actions including creation of healthy and hygienic environments in the streets, villages and working places of people, afforest ration, road and river improvement projects and land leveling and rezoning projects in every places regardless of urban and rural areas by mobilizing whole society and the entire people.

In DPR Korea, the aging process has been accelerated further, thus aging population was increased from 3.15 million in 2008 to about 3.41 million in early 2016. If current total fertility rate and pace of increase in life expectancy are maintained, it is estimated that population aged 60 years and over will be respectively 15.1% in 2020, 20.3% in 2030 and 23.4% in 2040 which is about 10% rise compared to current level or increase of 6.27 million in aged population. This indicates that the elderly will be increased by 3.03 million which is almost the same as current aged population in the next 25 years.

The government of DPR Korea provides active support for Korean Aged People Protection Association in order to respect the older persons and give them social benefits as well as to encourage the valuable social motivations among them while it organizes health care services for the older persons more appropriately with the foresight of increase in aging population.

The government's principle for forming up the urban population is to avoid the excessive urban density and to proportionately distribute the population through the medium and small-sized cities throughout the country.

This gives a positive effect on the successful solution of urbanization issue which is one of serious population problems globally. It also positively influences the health development by narrowing the geographical differences in public health between urban and rural areas.

Any economic activity damaging the environment and harming the health and well-being of the people is prohibited by the government. Even the field of valuable minerals including high quality gold and silver is not allowed to exploit if there is a risk of spoiling the beauty of natural scenery. Construction of every factory, building, hospital and house is strictly regulated by law to go through deliberations and approval in accordance with the master plan for land development of the State and public health standards, thus the healthy living and working environments for the population is ensured thoroughly.

Construction of hydroelectric power stations is pushed ahead vigorously and measures to make an active use of clean reproductive energy are carried out extensively to reduce CO2 emission.

The government has taken foresight steps considering impact of growing population on living environment. The Ministry of Public Health, under the coordinated leadership of the State, closely collaborates with relevant ministries and tries to fulfill its obligation to create better environment for the health and well-being of the people, based on in-depth analysis of interrelationship between the environmental development and health.

In DPR Korea, gender equity is thoroughly guaranteed in all walks of social life. There are different insurance systems, i.e. the social insurance system for the elderly, people who are incapable of working and physically disabled ones, the causality insurance system to indemnify for human loss from various accidents, and the property insurance system to compensate for the property damages.

In addition, protection of vulnerable groups including children, women, especially childbearing ones and the elderly who needs social protection, is legally ensured and considerable attention is paid to attract public interest to these groups. It exerts positive influence in reducing the mortality and improving health indicators related to child and maternal health.

Nursery homes, children's homes, primary and secondary schools for orphans have been built throughout the country, and retirement homes for aged people who do not have family to look after them have been established and operated at the State expense.

Thanks to the respected Supreme Leader **Kim Jong Un**'s noble love for younger generation and the future, Pyongyang Baby Home and Orphanage and Pyongyang Retirement Homes have been newly constructed in modern style as palaces for children and the elderly people, followed by completion and opening of modernized nursery homes, children's homes and retirement homes in all provinces.

2998 children in 14 nursery homes throughout the country are healthily growing up free from any care or worries at the State's full expense while 1902 children in 12 children's homes,

1837 pupils in 14 primary schools for orphans and 10,043 pupils in 14 secondary schools for orphans are also cultivating their talents to the utmost at the State's full expense as of 2015.

3. Child Health

3.1 Nutritional Care and Status of Children

Children's nutritional status is a reflection of their overall health. Children will reach to their growth potential and are considered well nourished when they have access to supply of adequately nutritious and safe food, are not exposed to repeated illness, and are well cared and protected.

Malnutrition is associated with more than half of all children deaths worldwide. Undernourished children are prone to die from common childhood illnesses, and for those who survive, have recurring diseases and faltering growth. Three quarters of the children who die from causes related to malnutrition were only mildly or moderately malnourished- showing no outward sign of their vulnerability.

A reduction in the prevalence of malnutrition will contribute to achieving the target for reduction in child mortality rate.

From the mid 1990s onwards, DPR Korea was confronted with problems of child malnutrition that were unprecedented in the past. Later, the situation was considerably improved.

MoPH expands the Integrated Management of Childhood Illness in nationwide scope as one critical components of strategy to improve the child nutrition and reduce the mortality and establish the child nutritional care system at the county and PHC level while they focus on building capacity for uninterrupted supply of essential medicine and equipment, and medical supplies.

Therefore, IMCI which pilot was initiated in 2 counties in 2006 was introduced in all 210 counties of the country and now, it is scaled up to PHC level with expansion of its content and depth like inclusion of mothers. And nutritional care for children which was partly covered in IMCI is being converted into more specific nutritional care system.

As shown in the table, several indicators were reduced during 1998-2012 by 20-33% compared with those in the baseline year. Professionalized MICS including nationwide nutritional evaluation were conducted 5 times during the period between 1998 and 2017 in DPR Korea

Table 3-1. Nutrition status of under-5 children (%)

Indicator	1998	2000	2009	2012	2017*
Underweight rate below 2 degree (Weight-for-age)	60.6	27.9	18.8	15.2	9.3
Stunted rate below 2 standard deviation (Height-for-age)	62.3	45.2	32.4	27.9	19.1
Wasted rate below 2 standard deviation (Weight-for-height)	15.6	10.4	5.2	4.0	2.5

A prominent deviation between 1998 and 2000 is mainly due to the change of WHO recommended indicators for nutritional assessment since 2000 and also probable errors in measurement included results 1998 multiple indicator cluster survey (MICS) as it was the first one in the country.

According to the results of 2017 MICS, the children's nutritional status have been presumed to be very rapdily improved during 5 years since 2012, though its result is not completely confirmed.

Height for age indicator showing the chronic malnutrition was decreased by almost 31.5% in 2017 compared with the level in 2012 while 37.5% for weight for height and 38.8% for weight for age, being very meaningful success achieved by the socioeconomic development and the active interventions made by the state.

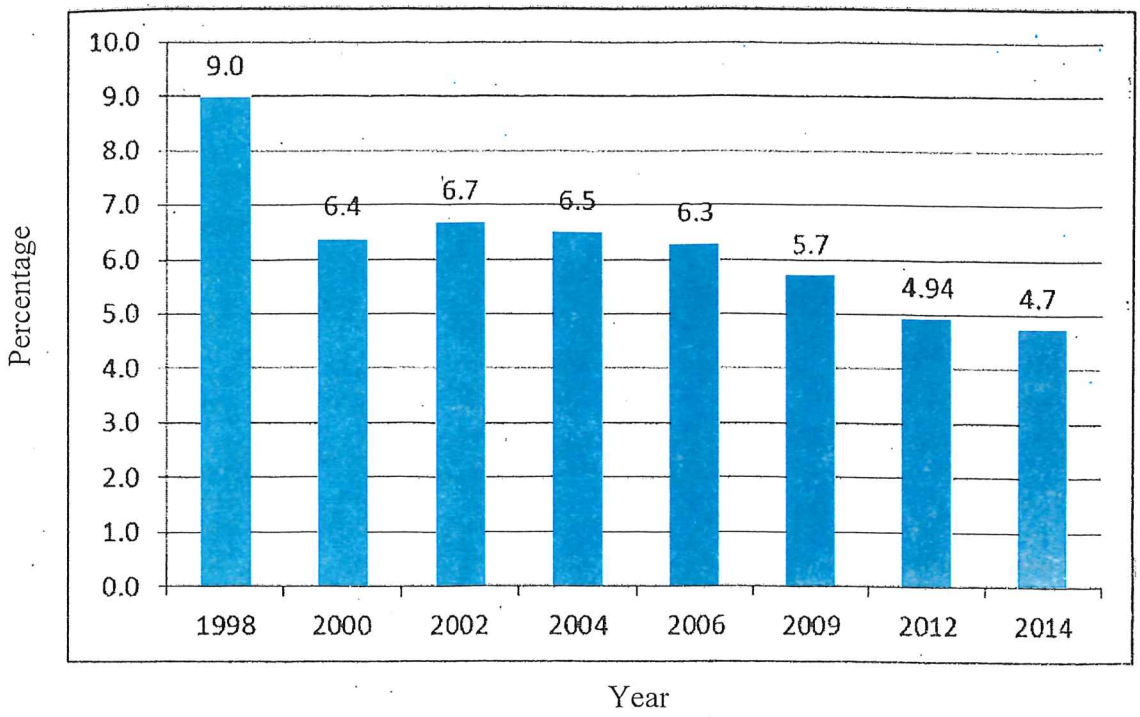
The sample survey of mid-upper arm circumference (MUAC) covering 25,131 children in 4 counties (Chonnae County, Haean District-Hamhung City, Hungdok District-Hamhung City, Hongwon County) in South Hamgyong and Kangwon Provinces in April 2014 found that malnutrition rate (SD 2) was 3.7% showing some improvement.

The sample survey of mid-upper arm circumference (MUAC) covering the children in 6 counties in October 2017 found that malnutrition rate (SD 2+) was 2.5% showing lots of improvement.

Weight at birth is a good indicator not only of a mother's health and nutritional status but also of a newborn's changes for survival, growth, long-term health and psychosocial development.

Low birth weight (less than 2,500 grams) carries a range of grave health risks for children. Babies who were undernourished in the womb face a greatly increased risk of dying during their early months and years. Those who survive have impaired immune function and increased risk of disease. They are likely to remain undernourished, with reduced muscle strength, throughout their lives, and suffer a higher incidence of diabetes and heart disease in later life.

Chart 3-1. Percentage newborns with low birth weight (%)



Children born underweight also tend to have a lower IQ and cognitive disabilities, affecting their performance in school and their usual activities.

Therefore, it is crucial to reduce the incidence of low birth weight for prevention of newborn and infant mortality.

According to the outcomes of the various surveys, incidence of low birth weight has almost halved in DPR Korea compared to the baseline year, i.e. it was reduced from 9% in 1998 to 5% in 2014.

Sustained and further improved child health indicators despite various challenges are considered as a great success.

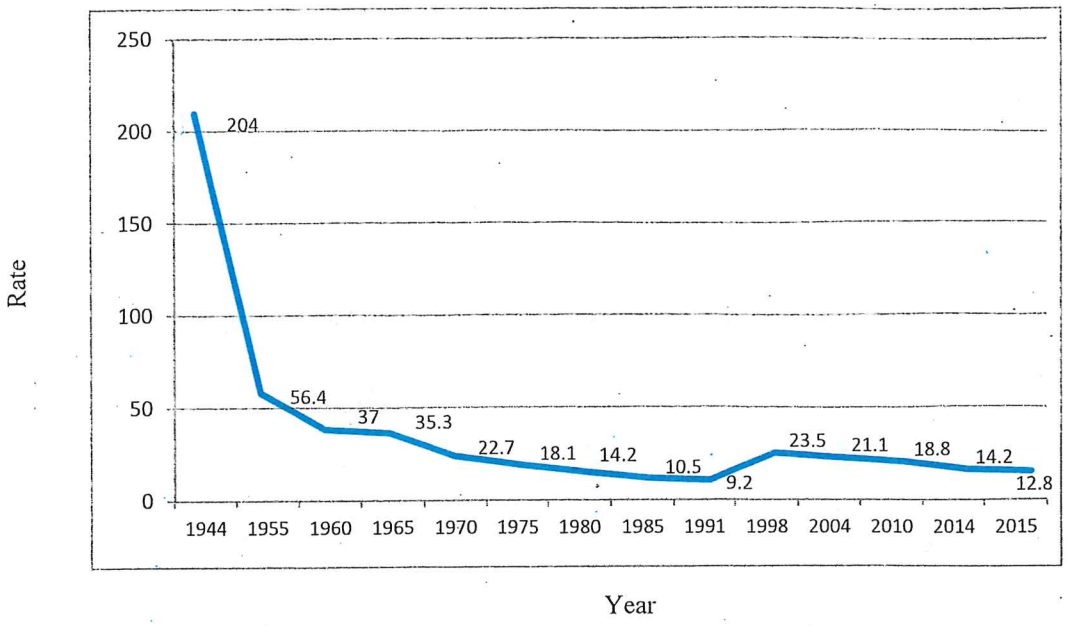
3.2 Child Mortality Rate and Main Cause of Death

Child Mortality Rate is one of the core indicators for evaluating socio-economic and health status of the country.

Table3-2. IMR and U5MR (Number of Deaths per 1000 live births)

Indicator	2000	2002	2004	2006	2008	2010	2012	2014	2015
IMR	21.8	22.7	21.1	19.5	19.3	18.8	16.7	14.2	12.8
U5MR	47.6	48.4	45.5	38.7	26.7	25.7	22.7	20.0	17.7

Chart 3-2. Infant Mortality Rate 1944-2015



As shown in figure 3-2, IMR was recorded at a very high level of 204 per 1,000 live births in 1944 before the liberation of the country. It improved rapidly after the liberation and reached to 9.2 per 1,000 live births in 1991 making almost 96% fall compared to 1944. It was highly advanced level thus the DPR Korea was regarded one of the countries achieved the lowest IMR globally. However, IMR worsened to 23.5 in 1998 due to aforementioned challenges. Over the period between 1998 and 2015, the IMR decreased by almost 45%, from 23.5 to 12.8 per 1000 live births.

The under-5 mortality ratio (U5MR) dropped from 49.7‰ in 1998 to 17.7‰ in 2015, decreasing by almost 60% compared with in the baseline year. There were disparities in child mortality rates between urban and rural areas as well as among provinces. Rural areas were 1.2 times higher than urban areas in infant mortality rates. Under- 5 mortality rate was also 1.2 times higher in rural versus urban areas.

The analysis on the main causes of death in children in recent years revealed that diarrhea and pneumonia were the leading causes. Analysis on the cause of children's death aged 7 days to 5 years who died in 12 provincial or central hospitals in 2015 showed 37% for pneumonia, 33.7% for diarrhea, 9.2% for trauma or burning and 6.8% for peritonitis and ileus.

4. Maternal Health

4.1 Reproductive Health

National Reproductive health Strategy 2011-2015 and 2017-2021 includes quality antenatal, childbirth, postnatal care, obstetric complications management by EmOC, safe abortion care, prevention, detection and management of STI/RTI and HIV/AIDS, infertility management, early detection and management of cervical cancer and breast cancer and climacteric disorders.

Ministry of Public Health is committed to the overall implementation of reproductive health strategy.

- Antenatal Care

The antenatal period presents important opportunities to reach pregnant women with interventions that may be vital to their health and well-being and that of their infants. Antenatal counseling is an important intervention to gain better understanding of fetal growth and development and their relationship to the mother's health, and improve both maternal and newborn health.

Result of 2012 survey showed that coverage of antenatal care visits at least 4 times during pregnancy was ranged between 86% and 99.5% with slight differences among cities and counties.

DPR Korea established a strike system that registers women in the early stage of their pregnancy and conducts a medical check-up on a regular basis; once every month, then once every fortnight or every week for those who are getting close to the time of delivery, thereby 17 times in total, however, since 2015, the number of antenatal care visits was changed to 6 times with higher quality service.

According to the data in 2014, the percentage of mothers who have received medical check up over 5 times during their pregnancy was about 92% while 100% of women received the antenatal care at a frequency of more than once.

Table 4-1. Antenatal Care Coverage (%)

Number of visits	1997	2002	2004	2006	2009	2012	2014
Total	100	100	100	100	100	100	100
1-3	5.9	5.3	5	6.1	6.5	6.1	8.2*
More than 4	94.1	94.2	95	92.7	93.5	93.9	91.8
Unknown	0	0.5	0	1.2	0	0	

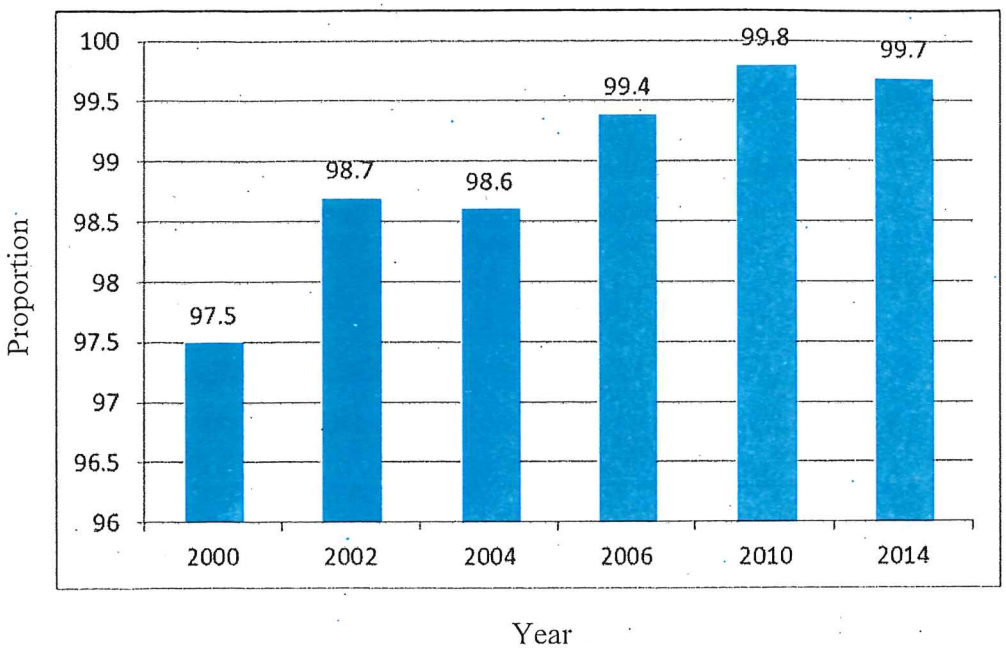
* 1-4 times

The early registration of pregnancy and the successive start of antenatal care are highly significant for reducing the maternal morbidity and mortality.

Results of the survey showed that almost all pregnant women in the country registered their pregnancy and received antenatal care.

This is the result of national public health policy that encourages women to register their pregnancy, in its early stage, at the obstetrics and gynecological departments of hospitals or polyclinics in their resident ri, up, ku or dongs and to receive medical check-up on a regular basis.

Chart 4-1. Proportion of women who have ever been to hospital for antenatal care (%)



As shown in chart 4.1, proportion of women who ever visited the hospitals for antenatal care was more than 99% since 2006.

85% of the women registered within the first three months of their pregnancy for antenatal care in 2014.

Table 4-2. Proportion of registered women by gestational age 2002-2014(%)

Gestational age	2002	2004	2006	2010	2011	2014
Over 3 months	41.9	41.6	38.7	19.1	18.4	15.0
Before 3 months	58.1	58.4	61.3	80.3	81.6	85.0
Don't know	0	0	0	0.6	0	0

As shown in table 4-2, percentage of women registering within 3 months of their pregnancy showed increasing tendency. This indicates that quality of antenatal care is being improved.

Skilled birth attendants and postnatal care

Three quarters of all maternal deaths globally occur during delivery and the immediate post-partum period. The most critical intervention for safe motherhood is to ensure that a competent health worker with midwifery skills is present at every birth, and that transport is available to a referral facility for obstetric care in case of emergency. This is effective for reducing not only maternal mortality but also the reduction of neonatal mortality.

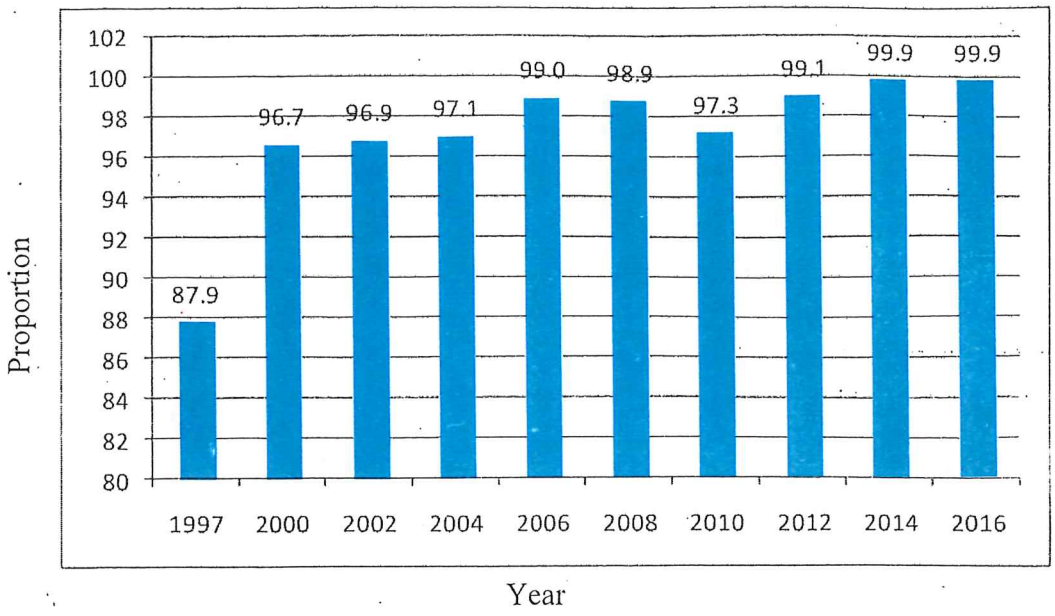
The proportion of births assisted by skilled health workers in DPR Korea reached almost 100% in the early 1990's, but dropped to a level below 90% in 1998.

The state intensified the section doctor system, increased the number of household doctors rapidly, and focused particularly on training and appointing of midwives, and providing favorable conditions for their work. Thanks to these endeavors, the proportion of delivery assisted by health personnel reverted to 96-99% from the beginning of 2000s, which clearly influenced the reduction of maternal mortality ratio.

The differences in the outcomes over the years are influenced by variations in sampling methodologies; i.e. the 2006 Reproductive Health Survey covered only the UNFPA support-focused areas while 2010 survey represented the whole country. According to results of 2014 SDHS, delivery assisted by doctors took major part of total delivery which was 100% in urban and 99.8% in rural areas.

Proportion of birth attended by skilled health personnel in 2016 was 99.9%, showing high level, as seen in chart 4-2.

Chart 4-2. Proportion of Birth Attended by Skilled Health Personnel (%)



The government of DPR Korea peruses the national policy of improving maternal health and operates a regular system where the state is completely responsible for health care for women before and after their delivery.

In 1970s, the Government put forward the tasks of setting up delivery rooms and providing inpatient delivery services at ri hospitals in rural areas, and strengthening capacity of maternity hospitals at central and provincial levels to provide technical guidance on maternal health care.

According to 2014 SDHS, the proportion of institutional delivery accounts for 90.1% while 8.9% for home-based delivery. According to 2010 Reproductive Health Survey, these indicators were 87.9% and 12.1%, respectively. These figures show continuous increase in institutional delivery.

According to 2014 SDHS, the proportion of postnatal care provided before 42 days after delivery was 98.9% while 76.2% for the postnatal care provided before 24 hours after birth.

- Contraceptive prevalence rate

The contraceptive prevalence rate in DPR Korea increased from 67.3% in 1997 to 78.2% in 2014 by making 10.9% increase over the reference period.

Table 4-3. Contraceptive prevalence rate among women 1997-2014 (%)

1997	2002	2004	2006	2010	2011	2014
67.3	68.6	70.1	69.1	70.6	70.7	78.2

The current level of awareness and utilization of family planning methods indicates that women's right to reproductive health are fully exercised while awareness and sense of responsibility for contraception among men are improved. But the majority of women are

biased towards intra uterine devices (IUD) so far. Hence, it is required to provide various methods of up-to-date contraceptive services, improve family planning services consequently, and ensure uninterrupted supply of essential supplies and information services.

Unmet need of family planning

One of the key issues in reproductive health is to fully satisfy the women's need for contraception and improve the quality of family planning services.

The unmet need for family planning was found to be 16.7% in 2002, 9.2% in 2006 and 7% in 2014.

Table 4-4. Unmeant need for family planning 2002-2014 (%)

2002	2004	2006	2014
16.7	9.2	9.6	7.0

As indicated in the data, focus should be placed on satisfying the need for family planning throughout the country, especially in rural areas, and conducting IEC activities on family planning to aid couples in choosing and utilizing more effective methods for controlling birth number and intervals. As such, the need of family planning can be fulfilled.

Awareness of family planning among married women at reproductive age (%)

Possessing good knowledge about various options for family planning is a prerequisite for choosing and utilizing effective and appropriate contraceptive methods. Modern family planning methods most familiar to married women are intra uterine devices (IUDs), female sterilization, male sterilization, condom, pill etc.

As shown in the table 4-5, there was no significant difference in overall wariness of family planning in2010, however proportion of women knowing 4 or more methods modern family planning was decreased compared to previous year. It is mainly because coverage of the survey, i.e. survey was conducted in only UNFPA focused areas until 2006, but it covered the whole country in 2010.

In addition, successful improvement in awareness rate of modern methods of family planning is resulted from continued health promotion conducted by health workers and distribution of vast number of IEC materials.

Table 4-5. Awareness rate of family planning among married women at reproductive age (%)

Indicator	1997	2002	2004	2006	2010	2014
Awareness rate	96.4	99.7	99.0	99.6	99.9	99.8
Awareness of more than four methods	60.4	73.1	73.2	77.3	69.1 (2011)	99.5

In order to get over the high mortality due to the war in 1950s and the pressing need for labor force for postwar rehabilitation and construction, the State pursued a national policy encouraging population growth and attached much significance to antenatal care, safe delivery services and postnatal care accordingly.

From the mid 1970s, the government has paid special attention to Family Planning. Considering increased women's involvement in social labor, improved birthrate derived from the policy encouraging population growth, and negative influence of short birth intervals, delivery and rearing of multiple children over the health status of women and children, the State has established well-structured system to provide counseling and free services for family planning. The family planning services are provided at hospitals and clinics under the guidance of the Ministry of Public Health. Surgeries (male and female sterilization) and maneuvers using medical instruments (insertion and removal of IUDs) are only performed by properly trained health personals in hospitals at county or upper levels.

For qualitative growth of population, the Government raised the social interests in population issues, improved maternal and child health and well-being, step by step, through legislation of the Public Health Law, the Family Law, the Law on the Nursing and Upbringing of Children and the Education Law, and established a system where women and children are cared at government's expense.

4.2 Maternal Mortality Ratio (per 100,000 live births)

The maternal mortality level is a major indicator of maternal and child healthcare and welfare as well as socio-economic development and civilization of the country.

Although pregnancy and delivery are common physiological processes, they pose a serious health risk for women.

Study on the burden and causes of maternal deaths and implementing preventive measures are crucial to protect the life and health of mothers and children and to achieve the socioeconomic and cultural development.

In DPR Korea, the maternal mortality ration (MMR) per 100,000 live births had risen to a level of 105 in 1997.

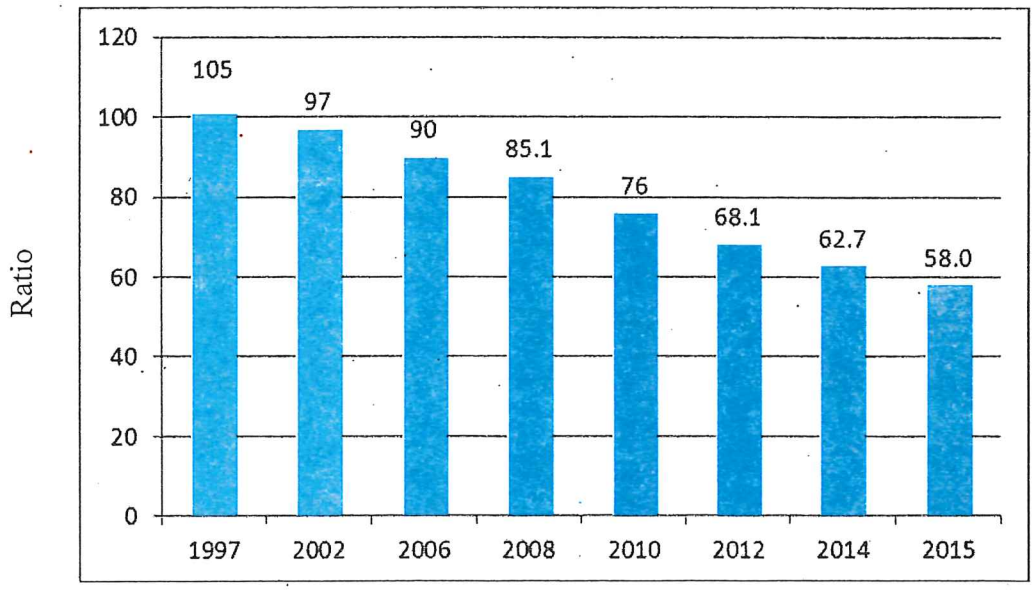
Recalling that average MMR globally was 400 at that time, it was almost one fourth of global average level.

It shows that rapid deterioration of maternal mortality ratio could be protected by devotional endeavors of health workers and government policy for maternal health in the worst condition of the country.

As reflected in the figure, national policy of improving maternal health and dedicated efforts of health workers have prevented deterioration of MMR which would be worsen otherwise.

Over the last decade, the MMR has gradually decreased. Such reduction was accelerated in mid 2000's, thus the MMR reached to 85.1 in 2000, 76 in 2010, 62.7 in 2014 and 58 in 2015 which was 45% decrease compared to 1997.

Chart 4-3. Maternal Mortality Ratio



Based on the second population census (2008) outcomes, a special additional survey on maternal mortality has been carried out countrywide in 2009. The survey found that percentage of under-reporting was 3.4% and that of over-reporting 11.2%, leading to 7.8% of net error rate.

Likewise, such error might be embodied in figures except census as they are collected from health facilities.

- Proportion of maternal mortality by place of death (%)

The special survey on maternal mortality in 2009 found that the deaths from home delivery accounted for 66.7% of total number of maternal deaths, i.e. two third of all maternal mortality, while 33.3% died from institutional deliveries.

The 2010 reproductive health survey showed that 12.1% of the deliveries took place either at home or outside of health facilities. The main reason behind high maternal mortality among the delivers at home or outside health facilities is considerable number of home deliveries still occurs in rural and mountainous areas.

This indicates the key issues in reproductive health sector are to ensure 100% of deliveries are attended by skilled health workers and to maximize the proportion of institutional deliveries.

5. COMMUNICABLE DISEASES

5.1 Vaccine Preventable Diseases

Immunization is conducted as the whole national and social activity. The country has technical and administrative system involving the State Hygienic Inspection Agency involved in MoPH and hygiene and anti-epidemic stations at each level, and research, production and supply system involving the vaccine manufacturing factories, the State Microbiological Inspection Centre, the Microbiological Research Institute and several research institutions to provide the material condition for the immunization.

The immunization is conducted by household doctors of clinics, grass-root level curative and preventive institutions for all people. GAVI, UNICEF and WHO provide active support for procurement of vaccines and immunization practice for implementation of EPI activities in the country.

The coverage of DPT3, poliomyelitis, tetanus, measles and BCG which was 90% in 1990 has dropped to 50% in 1997 due to various factors.

The MoPH has increased the productive capacity of local vaccine plants and expanded the cooperation with different international organizations to ensure 98% coverage of a variety of vaccinations for children, and the regular vaccination system has completely been recovered and even more strengthened.

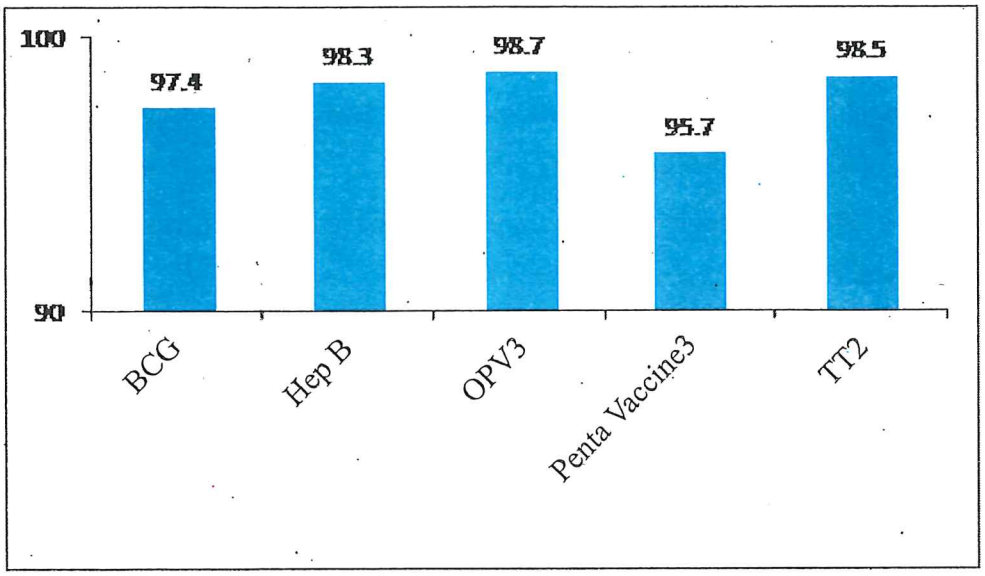
According to the findings of several surveys and regular reporting system including the joint assessment of MoPH and UNICEF, the coverage of measles vaccine have been maintained at the level of 95% since 2000 and increased further to 98.7% in 2016. 2016 Immunization coverage by antigens was 97.4% for BCG, 98.3% for HepB, 98.7% for OPV3, and 95.7% for PentaVaccine3.

It is necessary for pregnant women to receive TT2 immunization at least twice to reduce the infant mortality rate. TT2 should be vaccinated for pregnant women to protect the babies against the perinatal tetanus as one of infants' death caused by unsanitary environment during delivery.

The proportion of pregnant women immunized against tetanus at least twice was 4.6% in 1998, 38.9% in 2002, 61.2% in 2004, 67.4% in 2006, 97.8% in 2012, 98.1% in 2014 and 98.5% in 2016.

These results show that the health workers and women should be aware of the importance of TT2 vaccination and at the same time, the health workers should lead the TT2 vaccination for pregnant women in order.

Chart 5-1. Immunization coverage by antigens (%) 2016



5.2 TB Control

DPR Korea had very bad tuberculosis epidemic status before liberation (1945) when the country was occupied by Japan and until 1960s due to the impact of Fatherland Liberation War (1950-1953). However, thanks to endeavours of the State, tuberculosis epidemic status became relatively good in the worldwide scope in 1970s and 1980s.

Tuberculosis, with globally high prevalence and mortality among infectious diseases, turns considered again as one of diseases with great burden due to vicious sanctions of the United States of America and its satellite forces as well as repeated natural disasters.

Deep understanding of TB epidemics is very critical issue for scientific evaluation of implementation status of current ending TB strategy and for updating the future TB strategy and planning.

Lack of correct data was experienced in TB area in the past. The estimates of annual prevalence of TB based on tuberculin reaction in 2007 indicated differences between the estimates based on records and detection rates.

Ministry of Public Health decided to conduct the TB prevalence survey in the nationwide scope in order to perform scientific prevention and treatment of tuberculosis on the basis of more detailed evaluation of current TB epidemics of the country. TB prevalence survey conducted with support of GFTAM in 2015-2016 was the first one experienced in the country.

Therefore, good lesson learnt from other several countries' surveys were studied and then, based on the survey methodology for TB prevalence recommended by WHO, survey forms, standard of operation tools for every step for survey and all the processes of data analysis were adapted into our country's context.

Following these steps, nationwide TB prevalence survey was successfully conducted and the result of data was jointly analyzed with WHO TB team and shared.

The key result of TB prevalence survey is as follows;

7.9% of respondents(4 802) were suspected to receive sputum test with 3.2% for counselling alone, 3.1% for X-ray alone and 1.7% for both of cases, according to counselling and X ray test for detection of suspected cases.

The proportion of suspected cases has sexual variance with 10.8% for male respondents and 5.6% for female respondents, being twice in male cases compared with that of female cases.

The proportion of suspected cases increases along with aging and becomes a bit decreased again from age of 55 and over. There was no significant difference geographically, with a little higher proportion in rural areas compared with that in urban areas.

Table 5.1, Detection of suspected cases by sexuality, age, region, and province

Category		Normal		Counselling alone		x-ray test alone		Counselling+X ray test	
		Number	%	Number	%	Number	%	Number	%
Sexuality	Male	24122	89.2	1015	3.8	1160	4.3	737	2.7
	Female	31759	94.4	901	2.7	698	2.1	291	0.9
	Total	55881	92.1	1916	3.2	1858	3.1	1028	1.7
Age	15-24	9969	96.8	156	1.5	123	1.2	52	0.5
	25-34	10451	93.7	312	2.8	240	2.2	153	1.4
	35-44	11982	91.0	494	3.7	447	3.4	251	1.9
	45-54	11323	89.0	564	4.4	524	4.1	316	2.5
	55-65	6327	90.0	263	3.7	275	3.9	167	2.4
	65 and	5829	92.6	127	2.0	249	4.0	89	1.4
Geographic	Urban	31551	91.7	1264	3.7	1042	3.0	556	1.6
	Rural	21318	92.2	625	2.7	744	3.2	436	1.9

The proportion of smear positive cases out of confirmed cases was 55% and the remaining 45% was smear negative. The proportion of culture positive cases out of smear positive cases was 84.% while negative cases 15.5%

Table 5.2 Number of TB cases who experts committee confirmed(combined with follow-up results)

	TB cases responded	Proportion(%)
1	Smear+	55.0
	Culture+	84.5
	Culture-	15.5
	Total	100.0
2	Smear-	45.0
	Culture+	39.2
	Culture-	60.8
	Subtotal	100.0
	Total(1+2)	100.0

Estimated pulmonary TB prevalence rate based on the detected cases from survey was 567 (510~631) per 100 000 population.

Table5.3 Pulmonary TB prevalence rate bacteriologically confirmed among the population aged 15 and over

Category	Anlysis(Calculation) by enumeration area	Multiple value setting +reversed probability
	Pulmonary TB prevalence rate	Pulmonary TB prevalence rate
Total	567(510-631)	587(520-655)
Male	892(778-1005)	917(783-1052)
Female	309(249-369)	319(256-382)
15-24	146(72-220)	155(70-240)
25-34	525(390-660)	579(410-748)
35-44	732(585-879)	764(611-916)
45-54	825(665-984)	877(705-1049)
55-64	591(410-771)	595(410-781)
≥65	450(283-617)	444(264-624)
Urban	571(490-651)	577(489-665)
Rural	627524-730)	659(555-764)
Grouped living units	96 (0-205)	102(0-219)

Presumed TB prevalence rate in the enumeration areas with use of multiple value setting-based estimated model II taking into consideration the TB risk factors(eg. Hemoptysis, fever, fatigue) was 582 per 100 000.

If the case had no experimental result though it was one for sputum test using the TB estimation model III, then multiple value setting was introduced, following by application of reversed probability weighing for responsendent with or without qualification for sputum collection and resulting in 587 per 100 000 population of presumed TB prevalence rate in the enumeration areas.

Male pulmonary TB prevalence rate was 2.9 times higher than in female while the population aged 45-54 had the highest prevalence rate being 877 per 100 000. TB prevalence rate in rural areas was 1.14 times higher than that in urban areas.

When presuming by weighing the proportion of male versus female population aged 15 and over, the pulmonary TB prevalence rate of the nationwide population aged 15 and over was 597 per 100 000 population. TB prevalence rate in all types of population of the country was 641 per 100 000. Prevalence versus registration ratio of all TB cases was 1.3.

Understanding of change in knowledge, attitude and practice of the people on TB is one of important issues for suggesting the accurate direction towards ending TB.

In the Survey, five questions were suggested for evaluating the awareness on TB. 40.0% of respondents(24 296) were correctly answered to 3~4 questions while 40.4% (24 487) to 1~2 questions only. The proportion of the respondents who gave correct answers to all 5 questions was 13.4% while 6.3% of respondents didn't know any answers to questions. There was no significant variance between men and women.

The proportion of responds with "Yes" answer to the question whether he/she had ever heard about tuberculosis or not was 99.4% and only 0.6% with "no" answer. The information on tuberculosis was provided almost through health education with the proportion of 79.3%. The opportunities for providing the information with high proportion was IEC materials, fellows, medical books, family members or relations, TV, newspapers, and broadcast in turn.

The opportunities to provide information through health education, broadcast, TV, family members or relations and IEC materials had the high proportion in female compared with that in male because of their features with high possibility of contact with women. For example, health education was the highest in case of street propaganda while other opportunities like through newspapers had higher proportion in male compared with that in female.

The status of availability of health facilities of respondents is one of main indicators showing the change in practical behaviors.

Almost 60% of respondents who complained the suspected tuberculosis symptoms like cough for more than 15 days or hemoptysis in counseling had availability to health facilities

with the highest proportion of that to city or county(district) people's hospitals, or clinics. This could be referred to short distance for easy availability to these facilities.

Generally, the proportion of people who accessed to health facilities with the above-mentioned suspected tuberculosis symptoms was higher in male than in female, answering in 83.1% cases that they thought they had tuberculosis symptoms or they were suspected through various check-ups like regular counseling examination, which shows that almost of the people have deep common sense on tuberculosis and this is resulted from broad health education.

The proportion of respondents answered with "no special reason" to the specific reason not to go to the health facilities was 88% being the highest while 9.3% for that answered with "busy in work", 1% for that answered with" far to health facilities" and 1.3% for that answered with "afraid of being diagnosed tuberculosis".

The proportion of available health facilities for the people who were diagnosed tuberculosis or pleurisy in the past or are treated at present was 66.1% for city or county(district) people's hospitals, being highest, 12.1% for clinics, 12.2% for TB-specific facilities and 1% for self-care.

The proportion of the respondents with side effects who were diagnosed tuberculosis or pleurisy in the past or are treated at present was 9.7%

TB prevalence rate among the smokers was 1.27%, about 3 times higher than 0.43% of that among the non-smokers, which shows that smoking is one of main risk factors affecting tuberculosis incidence and that one of causes of high TB prevalence rate in male is high prevalence of smoking in male than that in female. And the reason that the TB prevalence rate in rural areas was higher than that in urban areas with high population density, which is one of specific features of the country different with other countries, takes accounts for high smoking prevalence in rural areas than that in urban areas.

Ministry of Public Health identified the achievement, experiences, lessons learnt and challenges in TB control activities which have been implemented up to date through this survey.

Appropriate combined approach of high sensitive tests including X ray test, culture test or Xpert test and sputum smear microscopy test is very critical for smear negative pulmonary TB cases with bacteriological confirmation due to misdiagnosis based on X ray suspected findings. In addition, detection of active cases for TB diagnosis should also adequately combine the various kinds of approaches including counseling on syndromes, chest X ray test, or sputum culture test.

Despite of much efforts of TB control programme, variance in the ratio of prevalence versu s registration requires further strengthening of health system and high availability of diagnosis a nd treatment.

In particular, strengthening of capacity at ri, dong clinic or city, county(district) people's ho spitals is essential for early diagnosis and care of tuberculosis since more than 50% of responde

nts with suspected symptoms visit these health facilities.

Clinical features of tuberculosis disorders should be systematically re-affirmed and the cap acity of health workers for tuberculosis diagnosis improved. Standard daily prescription-based DOTS approach should be reviewed in order to systematically analyze the curation rate as well as recurrence and to reduce the recurrence.

5.3 Malaria Control

Noticeable achievements have been made in the fight against malaria, which was rapidly widespread at the end of 1990s. The incidence of malaria has remarkably dropped.

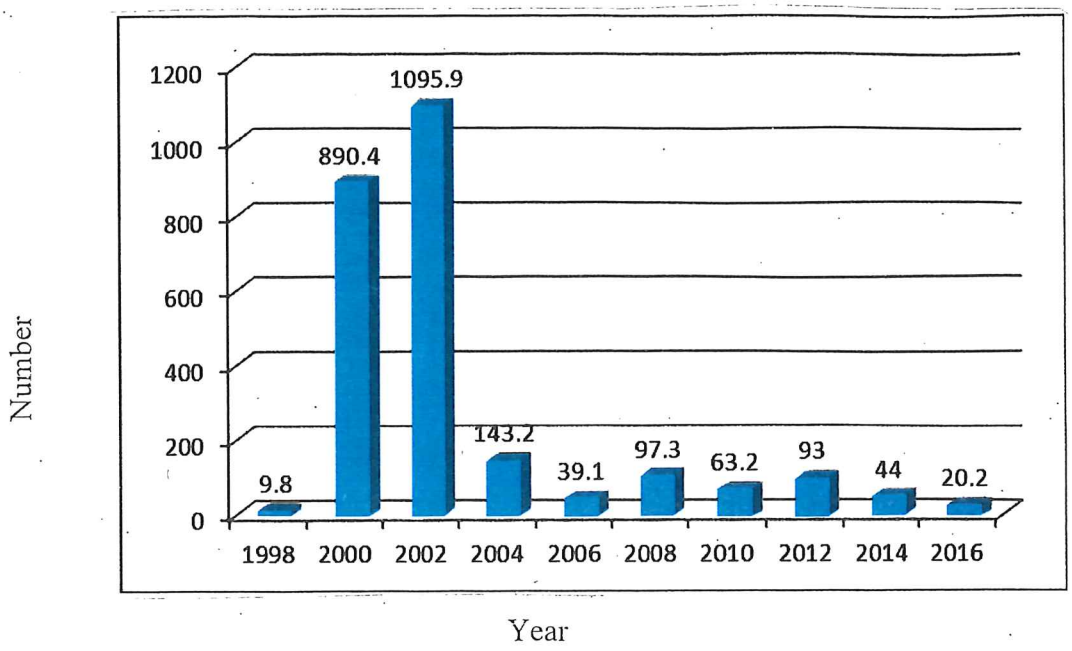
In DPRK, the occurrence of malaria has been suppressed for decades since elimination of the disease in early 1970s. But, in early 1990s, malaria was sporadically occurred and gradually, the incidence rate became rapidly high at the end of 1990s.

At that time, appropriate interventions could not be quickly taken for response to occurrence of malaria since it has not been developed for a long time in the country. The 300 000 cases of malaria occurrence in 2001 was dropped by 7 000 in 2007.

Malaria prevalent in DPR Korea is Vivax malaria with about 75% patients suffering from long latent type of disease occurrence. MoPH led the chemical prophylaxis with primaquin before appearance of mosquitoes.

After that time the cases of malaria have been remarkably dropped within a few years thanks to nation-wide fight against epidemics of malaria arisen up and the collaboration of international organizations. In particular, chemical prophylaxis by primaquin for millions of people in the epidemic areas of malaria in 2007 dropped the incidence rate by level of 7 000 in 2007. The malaria cases in 2016 was approximately 5 000 with incidence rate of 20 per 100,000 populations.

Chart 5-2. Number of Incidence Associated with Malaria per 100,000



Malaria prevalent in DPRK as Vivax Malaria causes no death differently with falciparum malaria.

According to the outcomes of 2015 KAP (knowledge, attitude and practice) survey on Malaria, awareness rate of malaria was at considerably high level of 99.6%, especially proportion of people with correct knowledge on transmission route of malaria was 97.3%.

The proportion of the population with accurate awareness on symptoms of malaria was 86.3%, higher than 18% compared with in 2011.

The proportion of the population with accurate awareness on the prevention approach of malaria was 96.71% while the proportion of respondents who answered that the patient with high fever in a household should go to doctor as soon as possible was 98.7% with 97.4% in urban areas and 99.65% in rural areas, respectively, showing higher level in rural areas. This was referred to strengthening of IEC education as well as activities for getting more access to the population in rural areas. The proportion of households using the nets during the period of mosquito epidemics was 68.74% while the proportion of children under-fiver sleeping under bed nets was 98.3%, which was higher than that of 2011.

Commonly conducted interventions of the household to eliminate the mosquitoes around the dwellings were upsetting the jar(58.31%), filling up the pool(38.09%) and arrangement of ditch(48.63%)

The persons registered as patient with malaria are treated with the surveillance of household doctors by free medical care system in DPRK.

Proportion of children under 5 who are treated with appropriate anti-malarial drugs was 100%.

5.4 HIV/AIDS Control

The government established the regular testing system against the risks of HIV/AIDS transmission from outside and took the necessary measures to set up the epidemiology surveillance teams at airports, seaports, borderline entry points and central hygiene and anti-epidemic centre.

In DPRK, the surveillance on HIV/AIDS is conducted by health staff responsible for infectious disease control in anti-epidemic centers of public health system, and HIV/AIDS test is available in special HIV/AIDS testing centers in central and 75 local areas, provincial blood transfusion centers, and some cities and counties.

Thanks to strenuous efforts of the government and WHO, HIV/AIDS test could be made for 103 205 cases from risk groups in 2016, resulting in no single case of HIV/AIDS + in DPRK so far. Until now, 28 foreigners were evaluated as positive as a result of HIV/AIDS test among the risk group of 400 foreigners.

It is a prerequisite for reduction of infection rate of HIV/AIDS to know how infected HIV/AIDS is and how to prevent its infection. High awareness about the disease is the first step to provide the young people with the means for prevention of infection.

Generally, mistaken understanding about HIV/AIDS brings the confusion among the young people to fight against the disease. According to survey, the proportion of the people aged 15 years and over with correct awareness about HIV/AIDS is higher in male than in female.

According to the survey results, proportion of population aged 15 years and above with correct knowledge of HIV/AIDS was higher for men than women.

This awareness presents the awareness about more than 2 correct methods for prevention of HIV/AIDS.

The data for year 2004 and 2006 in table 5.4 were from the survey on reproductive health in UNFPA target areas, data for year 2009 from the multiple indicators survey conducted at state level and data for 2011 from the survey at state level and its result tends to decline a little because the survey for 2011 was on the full understanding about the prevention and infection.

The result of survey on quality of reproductive health care conducted with support of UNFPA in 2017 showed much increase of this proportion, though not reaching the sufficient level.

Table 5-4. Proportion of Adult People with Full Awareness about HIV/AIDS (%)

Gender	2004	2006	2009	2011	2017
Male	32.9	50.3		38.0	
Female	22.8	39.8	36.9	35.0	
Total					55

The above result shows that IEC activities about HIV/AIDS should be continuously carried out.

5.5 Other Hygienic and Anti-epidemic Interventions

The government is making the nationwide efforts to preserve the living environment and production condition in hygienic and cultural ways, to locate and construct all buildings meeting the hygienic requirements, and to prevent pollutions, thus contributing to protection and improvement of people's health.

The government and MoPH has also concerned about proper management of water sources and supply of safe drinking water to the people.

The standardization of drinking water quality has been introduced throughout whole country and water quality is regularly tested in the different inspection points designated by the government.

In 2008, the sample survey was made in some areas to review the situation of drinking water supply to individual households and indicated very high standard of water supply such as 96% households with tap water (households-water-service in urban areas and 77% households with tap water in rural areas.

According to the result of Multiple Indicator Cluster Survey in 2009, the rate of utilization of improved drinking water reached on 99.9%.

The updated technologies like nano techniques have been introduced to purify and disinfect the drinking water for better quality in urban cities including Pyongyang and these technologies are now disseminated throughout whole country.

The proper waste disposal facilities were available for 99.2% of total populations already in 2004, and inside latrines were used by 92% households in urban areas and 83% households in rural areas according to the sample survey of 2008.

According to the result of 2009 Multiple Indicator Cluster Survey, the proportion of population using the improved sanitary facilities is 83.2%.

According to 2014 SDHS, the proportion of households with water supply facilities was 84.2% with 89% in urban areas and 76.6% in rural areas while the proportion of household with improved sanitation facilities 63.2% with 72.1% in urban areas and 48.8% in rural areas.

The government is pursuing various measures to restore the existing water supply systems, improve the natural gravity systems, increase the portion of waster system in supply of safe drinking water, and to raise the number of improved sanitation facilities in rural areas.

In addition, the sewage-purification field which is the largest in Pyongyang is modernized for adequate disposal of various wastes and sewage, and primary completion of infrastructures in all buildings is set as an important principle of construction

The results of water quality and bacteriological tests in 2014 with samples from 5 water sources, 24 pumping stations, 13 underground water, 3 tube wells, 9 water wells and 1 spring showed that all the indicators reached to global standards.

Table 5-5. Analysis of chemical indicators

Source	Indicator	Min	Max	Average
All sources (55)	pH	6.8	8.2	7.7
	Turbidity (NTU)	0	8.6	1.5
	Sulfate(mg/L)	0	60.3	26.12
	Nitrate(mg/L)	0.01	0.45	0.05
	Nitrite(mg/L)	0	0.043	0.001
	Total iron	0	0.7	0.02
	Fluoride(mg/L)	0	0.6	0.48
	Arsenic(mg/L)	0	0	0
	Chloride(mg/L)	1	200	23.67

Table 5-6. Bacteriological indicators

Source	Total (# of colonies/ml)			E.coli(# of colonies/100ml)		
	Min	Max	Avg	Min	Max	Avg
Water source	-	-	-	0	70	26.6
Pumping	5	49	13.2	0	0	0
Tap water	8	213	26.6	0	3	0.14
Undergrou	10	86	38.9	0	1	0.2
Water well	32	148	82.8	0	5	1.1
Tube well	49	54	52	0	1	0.3
Spring	2	2	2.0	0	0	0
Stored water	9	1218	99.4	0	24	1.65

The government regards it as one of its primary mandates to take advanced measures to prevent the people from being sick and puts the first priority to preventive medicine, especially prevention of communicable diseases. For this purpose, the fundamental concern should be paid to health education and promotional campaigns for people to raise their awareness and knowledge on health and hygiene and to strictly remove the risk factors of infectious diseases.

The government is making the continuous rather than temporary efforts to strictly hold hygienic norms for safe work and in food production and handling and to take anti-epidemic measures thoroughly.

During 2016 alone, millions copies of various types of IEC materials have been produced and published. The activities for nation-wide standardization of indicators for controlling the communicable diseases have been strengthened and the qualities of surveillance and evaluation have been intensified since 2010.

Accordingly, main communicable diseases prevailing since mid 1990s had abruptly decreased. Since there have been no incidence reports of Japanese encephalitis which was often incident in 2000s as well as pertussis.

Responding to global pandemic of new human influenza, the government has created the strict quarantine and disease surveillance system to ban any case entrance into the country and taken every possible measure, so that there has been no reports since 2011.

In addition, the State has taken strict emergency anti-epidemic measures in the context of outbreak of EVD and MersCoV affecting different parts of the world, thus not a single case has been imported. Such measures are pursued nationwide considering that the diseases are not completely stopped globally.

MoPH annually conducts population-based deworming in spring and autumn to prevent the incidence of parasite diseases among the population. According to the result from the Survey on soil-transmitted disease infection rate before population-based deworming in autumn conducted in 2015, the infection rate was 26.1% for pre-school children, 31.2% for schoolhood children and 30.8% for adults.

Taking into account the importance of washing hands for prevention of parasite disease, MoPH is broadly providing health education in order to make this intervention conducted among the whole population.

6. Control of Non-Communicable Diseases

The population aging, the changes in dietary life, and the increase of population engaged in intellectual labor give impact on rapid increase of occurrence of circulatory diseases such as the hypertension and heart disease.

According to survey in 2009, prevalence rates of hypertension among 25-64 year-old population were 20.4% in male and 17% in female respectively.

The average body mass index (BMI) was 21.6 in male and 21.3 in female and proportion of population with BMI above 25 was not so high; 4.14% in male and 4.7% in female .

The survey conducted in 2009 showed the excessive alcohol rate was 25.9% (over one bottle at a drinking). Excessive alcohol consumption as well as smoking is the major factor of NCD..

Survey conducted in 2014 covering population aged 35 and over in selected parts of Pyongyang City indicated that prevalence rates of hypertension, BMI over 23 and diabetes were 14.12-14.94%, 22.83-26.02% and 3.05-3.9% respectively. Proportion of people with cholesterol level higher than 6.6 ㏖/L was 1.33-1.37%.

Survey conducted in 2016 covering population aged 18 and over indicated that prevalence rates of drinking alcohol was 20.9%, with 43.7% for men and 2.2% for women respectively. Proportion of people who overdrank was 17.5%, being at relatively low level.

And the average BMI was 22.4 for men and 22.8 for women while the prevalence rates of BMI over 25 as indicator showing the obesity were 5.40% for men and 9.94% for women, respectively. The proportion of prevalence of hypertension was 16.1% with 19.9% for men and 13.1% for women, being a little increase with that of the past survey.

The proportion of prevalence of diabetes was 3.4% with 3.2% for men and 3.5% for women Proportion of people with cholesterol level higher than 6.6 ㏖/L was 1.4%.

Based on this status, main risk factors for NCD including smoking, excessive drinking of alcohol, inadequate physical activity, insufficient traffic environment, working condition and biological environment are focused and several interventions to reduce these risk factors as much as possible have been made.

The government provides active health education on prevention approach of NCD through health care or educational network and various means of IEC activities while it empowers the people to limit smoking and alcohol intake, to have the appropriate dietary habit, and to reduce the inadequate physical activity and stress as much as possible by encouraging the walking and physical exercise during recesses in all working stations

Based on the smoking damage to health, the government adopted the decision of "To strictly limit smoking in whole nation" on Jan 15 1986 and "Tobacco Control Law, DPR Korea" (20 July 2005) and conducted the activities against smoking over the whole country.

The propaganda on smoking damage are implemented through the various means and health services network and the massive movement against smoking and the research on decrease of smoking prevalence are ongoing. Thus, the awareness of smoking damage and the efforts to quit the smoking are increased among the population.

The nationwide sample survey on prevalence of smoking conducted in 2009 showed the smoking prevalence of male adult was 52.3%. The average cigarette number of daily consumption was 12.4 and the average age to begin smoking was 23.1. This showed the smoking prevalence was 2.5% decreased and the average cigarette number of daily consumption was 2.5 reduced in the past 3 years, showing the decrease rate of the smoking prevalence and the average cigarette number of daily consumption became more rapid than ones in the period of 2004-2006.

According to 2013 nation-wide adult smoking prevalence survey covering adult men, prevalence of smoking was 43.9% with 43.2% in urban areas and 44.5% in rural areas. This shows that the smoking prevalence is remarkably decreased as well as 8.4% compared with in 2009 with faster decrease rate of smoking prevalence

The survey found out the group with the highest smoking prevalence is aged between 45 and 54.

The result of smoking survey conducted in 2015-2016 was as follows;

Table 6.1 Proportion of smoking status of population aged 15 and over by age and sexuality

Group		Yes		No smoking		Cessation	
		Number	%	Number	%	Number	%
15-24	Male	876	19.7	3571	80.3	2	0.04
	Female	0	0.0	5851	100.0	0	0.00
	Subtotal	876	8.5	9422	91.5	2	0.02
25-34	Male	2192	45.4	2631	54.4	9	0.19
	Female	0	0.0	6324	100.0	0	0.00
	Subtotal	2192	19.6	8955	80.3	9	0.08
35-44	Male	3007	47.6	3297	52.2	14	0.22
	Female	0	0.0	6856	100.0	0	0.00
	Subtotal	3007	22.8	10153	77.1	14	0.11
45-54	Male	2762	46.2	3195	53.5	16	0.27
	Female	0	0.0	6752	100.0	2	0.03
	Subtotal	2762	21.7	9947	78.2	18	0.14
55-64	Male	1500	45.7	1771	53.9	12	0.37
	Female	4	0.1	3741	99.8	4	0.11

	Subtotal	1504	21.4	5512	78.4	16	0.23
65 and more	Male	761	34.9	1409	64.7	9	0.41
	Female	4	0.1	4110	99.9	1	0.02
	Subtotal	765	12.2	5519	87.7	10	0.16
Total	Male	11098	41.1	15874	58.7	62	0.23
	Female	8	0.02	33634	99.96	7	0.02
	Subtotal	11106	18.3	49508	81.6	69	0.11

The prevalence of smoking of the population aged 15 and over was 18.3% for men and 0.02% for women, being close to almost 9%. 0.11% of the respondents of the survey was smokers, however, don't smoke at all at present. The smoking prevalence of the men by age trends gradual increase along with age, showing decrease compared with in 2013 as well as continuous decrease during the past decade.

The MoPH under the guideline by government also put great attention to the injury prevention. The government fixed the May and the November as the "Months of Accident Prevention"; conducted the propaganda education and control activities to prevent the accidents including the traffic, fire accidents; thus the injury and diseases due to accidents are gradually decreased.

The government established the system for education and measures on safety and protection of workers, and specialized treatment is done for the injury patients in the emergency and trauma surgery sections in prevention and treatment institutions and the orthopedics special hospital, built prosthesis factories in Hamhung and Songrim, and provide the prosthesis systematically for the necessary subjects.

The Hygiene Institute, the Industrial Medical Institute, the Anti-epidemic station and the Environment Protection Institute conduct deep research for this field, thus the scientific measures for working protection have been established

These show that the health institutions and all the institutions and enterprises consider the health promotion of population as one of the most important work, and participate there with responsibility.

The research institutions of health administration and the education method make a regular inspection and updating the research and evaluation of health care workload for the sanitary propaganda and the health promotion by doctors mobilized in household doctor system and the research of education and propaganda method, and the assessment on effectiveness of health promotion program.

7. Development of Health System

7.1 Organizational structure of health system

The main administrative bodies guiding public health are the Ministry of Public Health (MoPH), Public Health Bureau in Provincial People's Committees and Department of Public Health in City/County People's Committees.

The MoPH, as a government department responsible for whole of public health sector of the country, provides leadership in public health work (including nurseries) through its guidance and control over Public Health Bureaus in Provincial People's Committees, general hospitals, specialized hospitals, central hygiene and anti-epidemic institutions and medicine supply centers at central level. In addition, it ensures connections with other ministries under the guidance of the cabinet to carry out the health work as affairs involving the whole society and the whole country.

At times of emergencies like disasters, MoPH sets up the non-standing mechanisms to organize and coordinate the emergency health activities.

The State Hygiene and Epidemic Control Board is an organization in charge of hygienic and anti-epidemic works including control of communicable diseases throughout the country.

The Public Health Bureaus in provincial people's committees provide leadership and control of general health work in the provinces through their guidance to city and county level health authorities, people's hospitals, specialized hospitals, anti-epidemic institutions and medical supply centers in the relevant province.

The Public Health Departments of city(district) and county people's committees are responsible for general public health in the respective cities and counties, guiding the preventive and curative services of city(district) and county hospitals, Ri hospitals and poly-clinics, hygiene and anti-epidemic and medical supply centers.

The curative and preventive institutes like hospitals and hygiene and anti-epidemic institutions on each level provide the technical and methodological guidance to the lower level hospitals and hygiene and anti-epidemic institutions.

The city, district and county hospitals, as general facilities with various specialized departments, provide specialized medical services and serves as front line referral institutions for primary health facilities.

Central and provincial hospitals and specialized institutions provide more sub-divided and specialized medical services of higher level.

The logistics networks for medicines and supplies involve central medical warehouse and material supply agency under the MoPH, and medical and non-medical warehouses at provincial, city and county levels.

DPR Korea has set up well-organized system of management and control of medicine resources, and delivery of medicines to all health facilities supply system through the medicine supply chain from central down to provincial, city(district) and county medical warehouses. The main principle in supply of medicines is to identify the variety and quantity of proving medicines in accordance with the burden of disease in each region and the features of curative and preventive units. Use of medicines follows the prescriptions from doctors.

Production, storage, use and management of medicines are legally controlled by the Law on Management of Medical supplies and Medicguarines, DPR Korea

The drug regulatory authorities at central, provincial and county levels control the quality of medicines through verification of efficacy and pharmacological effects of pipeline and locally produced medicines and every imported medicines. Registration of medicines follows the regulations and procedures formulated by the State, and adverse reactions are routinely monitored through all the curative and preventive institutions and the drug regulatory authorities.

Annually, approximately 60 000 cases are verified with average 1.4 days for one case. The proportion of the disqualified is 3-4%.

7.2 Development in management of resources for health

7.2.1 Management of human resources for health

The country has a huge number of highly educated health personals and a basis for training of health workers.

By the end of 2016, the number of doctors was 93,667, with 10,094 pharmacists, thus the number of senior health workers reached to 103,761.

As for the proportion of doctors by qualification, clinicians were 86% and Koryo traditional doctors were 6% of the total number and the rest were dentists and hygiene doctors.

The number of health staffs per 10,000 populations was 37 for doctors and 41 for both doctors and pharmacists.

This shows the continuous increase of these health workers during the past decade.

The government sets lessening the differences in the distribution of health facilities and personnel are between urban and rural areas and between plain and mountain areas as the main principle in health planning and makes steady efforts to implement it. As a solution to prevent excessive health workers in urban areas, especially in central and provincial level hospitals, it took measures to significantly increase the enrollment of students from counties, farms, coal mines, or mining areas in medical colleges and health training facilities and encourages them to volunteer to work in their hometowns and villages.

It has pursued the principle to maintain the distribution of health personnel at 75~80% for health workers in charge of outpatient treatment at primary health care level, 10~15% for city(district) and county level, 3~5% for provincial level and 0.5~1% for those at the central health facilities.

The government has established and implemented the strategy to train health workers in accordance with the increase in population and health facilities, raise in the quality and level of specialization of health services, and global trend in health development.

Ensuring the geographical balance of training need, meeting the training need according to specialization, gradually increasing the proportion of traditional doctors, reflecting the global development in public health and medical science, increasing the proportion of female health workers in pharmacists, detests, ophthalmologists, ENT doctors, pediatrician, obstetricians and gynecologists, and systematically training the doctors of special talents and skills are the principles that have been adhered to in assessment of training need for health workers. .

There are about 200 training institutions including 15 medical colleges at central and provincial levels, 66 nursing schools, and the schools of midwifery, dental prosthesis, massage therapy, X-ray medicine; and the Government is strengthening the systems of full time pre-service training, part time education while working and reorientation well as reorientation.

The Ministry of Public Health is closely cooperating with the training institutions for health personnel's. It develops the training plan for health workers according to the State health policy and health development trends, regularly updates the education contents to fit with the reality in cooperation of Ministry of Education, and gives the administrative and practical guidance and assistance to implement the training program by indicators. The MoPH has closely collaborated with development partners including WHO, UNICEF, UNFPA, GAVI and GFTAM in this area.

7.2.2 Health Facility

DPR Korea has a vast network of health facilities.

By the end of 2016, there existed 1,830 hospitals at different levels including general hospitals and specialized hospitals at central and provincial levels, 55 preventive institutions, 6,263 poly-clinics and clinics and 682 sanatoriums for preventive and curative care.

It also has 235 hygiene and anti-epidemic institutions established at central, provincial, city, district and county levels to cover the prevention and control of communicable diseases. The number of facilities has increased by 88 compared to 2008.

The number of beds was 128 for 10,000 populations.

Table 7-1. Number of health facilities by category 2016

Category	Number
Central and provincial hospitals	136
Hygiene and anti-epidemic	235
Preventive Institutions	55
Sanatoriums	682
City, county and ri hospitals	1 694
Polyclinics and clinics	6 263
Blood transfusion centers	12
Total	9 077

Ri hospitals, polyclinics and clinics providing primary health care services are located within 30 minutes walking distance. The city(district) and county hospitals which provide specialized medical services are accessible in one hour by public transport.

The MoPH has tried to modernize all the health facilities throughout the country according to the requirements of new era, thus almost all the health facilities have been updated in the last 2-3 years. WHO and other international organizations have contributed to rehabilitation of buildings and updating of equipments of health facilities.

All the health institutions in DPR Korea are public facilities, thus the main source of financing health is the expenditure from state revenue.

Emergency, regular and voluntary support from international organizations and humanitarian aid agencies including WHO also shares the financial resources for health.

The State spent 6.6% of the total state budget on health in 2006 with 6.1-6.4% in recent years. Recalling that health expenditure was 5.9% of total state budget in 2000, 6.1% in 2010, and GDP was increased by 6-9% annually; this clearly indicates considerable increase in government investment to the public health for recent years.

Based on aforementioned financial resources, the State covers the expenditure on prevention, delivery of health services within the frame of comprehensive and universal free medical care system, construction and operation of vast number of health facilities and research institutions in health sector, salaries for health workers, and other expenses in health.

7.2.3 Provision and management of medicines and other supplies

The government regards production and provision of medical supplies including medicines as an important factor for smooth operation of free medical care system and strengthening logistics and technical basis for health facilities.

Directing primary efforts to produce essential medicines, vaccines and Koryo traditional medicines, the State is taking necessary measures to definitely increase the variety and quantity of medicines including synthetic and semi-synthetic medicines, vitamins, hormones, broad-spectrum antibiotics and anti-cancer medicines. By directing great efforts for production of OTC medicines, the variety and quantity of locally manufactured ones have been increased remarkably. Vigorous efforts have been made to upgrade the pharmaceutical production units in arrogance with GMP standards.

Production of medicines is mainly performed by central pharmaceutical plants and the local ones in provinces, cities and counties, while the health facilities at all levels also set up their own bases of medicine production and make their own supply of certain medicines that are desperately required in their works. Factories and units producing Koryo traditional medicines have been established at county and health facilities at all levels, thereby proportion of traditional medicines in pharmaceutical production is being increased.

270 medicines are listed as essential medicines and being used in all health facilities. 40 or more essential medicines recommended by WHO are being used in the poly-clinics in urban areas, ri-hospitals in rural areas and industrial clinics which are the major units of primary health care.

In order to establish the well-organized and need-based delivery system of medicines and other operational items from central down to peripheral levels and to properly coordinate the management and utilization of medicines, MoPH has set up a computer-based logistic management system connecting all the provinces and realizes computerization by extending the computer network to lowest units.

7.3 Development of Health information system

The health management information system is committed to collect, compile, analyze and provide all the information required for monitoring and implementation of the national health policies, planning, implementation and monitoring of the public health work, and taking relevant measures.

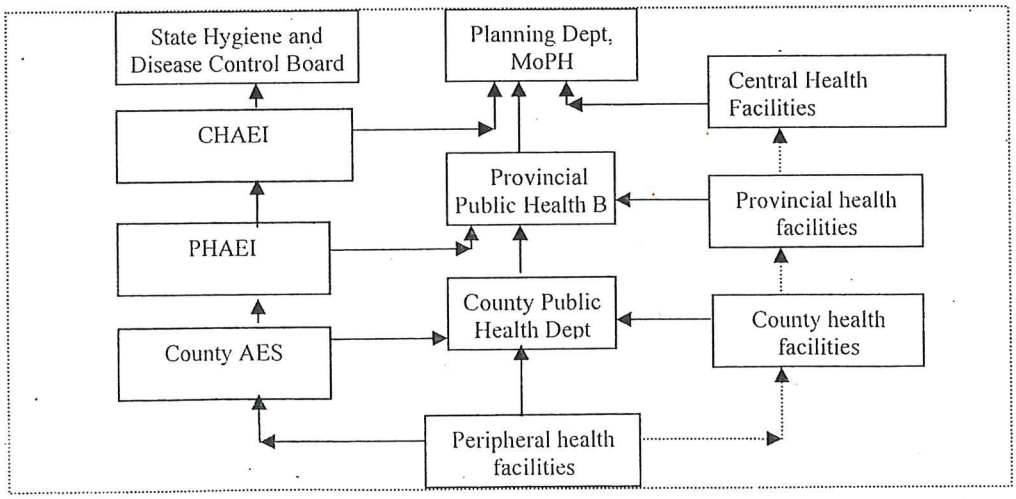
A well-organized health management information system which is an important basis for building socialist public health and also the main component of health system has been established from peripheral to central level and improved further to meet the requirement of the age of information industry and knowledge based economy.

The core of the health management information system (HMIS) is regular reporting system of health management information and occasional surveys and studies with the sampling survey and study conducted as per the needs are also considered as important information sources and components of HMIS.

The routine report system is a health information system where the various statistical data collected by peripheral health facilities on health status of population, disease burden, performance of health facilities and resource management are being reported to and compiled at upper level health institutions.

Health information are reported to and compiled at MoPH with different intervals according to their characteristics, i.e. daily, every ten days, monthly, quarterly, semiannually and annually. Dual reporting system is applied into the surveillance of communicable diseases due to its importance, urgency and specificity of hygiene and anti-epidemic institutes.

Flowchart of routine reporting system: *Line: mainstream, Dot line: additional flow*



Functional specificity of the hygiene and anti-epidemic institutions need to be considered, for confirmation of communicable diseases can only be made by hygiene and anti-epidemic

institutions even if initial detection is made by health facilities at all levels including peripheral one.

The essential indicators to assess the performance of public health system have recently been discussed, identified and applied to routine reporting system.

MoPH has paid great attention to establishing and developing the integrated health information system based on understanding the important role of health information in the policy making, planning and management of public health.

The key elements in establishing integrated health information system are training of staff able to effectively manage and operate the vast system, standardization of indicators, building up integrated database, development and management of composite health information system, and coordinated and cost-effective development and management of health information resources including information on up-to-date information technology, equipments and means.

For this purpose, the national guidelines on integration of vertical health information systems have been developed and non-standing health information coordination committee of have been established in the MoPH for coordinated implementation of strategy on e-health.

Currently, computerization of every statistic works has been actively pushed and preparation for establishing of computer-based integrated health information system at health facilities at county and higher levels is actively facilitated. It is also facilitated to expand Integrated Hospital Management Information System jointly developed by Pyongyang Medical College Hospital under **Kim Il Sung** University, Okryu Children's Hospital, Ryugyong Dental Hospital and Pyongyang Maternity hospital to health facilities at all levels.

The health information are collected to understand in detail and improve the health situation by strengthening the vertical and horizontal information system on regular basis and carrying out the census and sample surveys within health authorities and research institutes for public health administration of curative and preventive facilities at each level.

Likewise health management information system, the information service system of medical science and technology is rapidly developing. Major examples are the tele-medicine service between central hospitals and local ones and stockpile and dissemination of medical science and technological information by the library, Pyongyang Medical College under **Kim Il Sung** University as medical information centre.

Introduction of tele-medicine system contributes to improvement of superiority of free medical care system for people in DPRK. Currently, tele-mentoring system for medical service

connecting Pyongyang and provincial hospitals is introduced in 12 provinces/municipality and all city/district (county) hospitals.

The number of teleconsulation and training through telemedicine system was 2 778 and 621, respectively in 2015 while 5 589 and 763 in 2016 with more than twice increase in consultation, showing very active operationalization of telemedicine.

MoPH prepares the utilization of this tele-medicine system in health management information reporting system as well as health care service along with the establishment of infrastructure ensuring all kinds of the health information sharing and communication thanks to introduction of tele-medicine system.

The MoPH is suffering from such obstacles as lacks of up-to-date information equipments and competent technical staff, however establishing the health information management system throughout computer networks, meeting the demands of information era and moving from developing separated partial health information system to integrated one more efficient for resource mobilization, management and utilization of information.

8. Improvement of health care service

In recent years, the state has pushed ahead the activities for building the modern health facilities, resulting in excellent ones which can be worlwidely proud of, like Breast Cancer Institute, Okryu Children's Hospital, Ryugyong Dental Hospital, and Ryugyong Ophthalmologic General Hospital as well Health Oxygen Factory along with constructing of health oxygen factories or provision posts in every province.

The great efforts are made to reinforce the section doctor system, focusing on the primary health care in DPRK.

The primary health services of government's health care system are provided by poly-clinics or clinics in urban areas, Ri-hospitals or Ri-clinics in rural areas and industrial hospitals or industrial clinics in industrial areas.

The household doctor system has further been consolidated to cover all populations without any missing people for health care service in the DPRK.

Ri-hospitals and poly-clinics have moved to entirely take care of primary health care mainly with section doctor system.

The total number of medical doctors engaged in household doctor system was about 45 000, with one household doctor responsible for about 130 households.

The structures of Ri-hospitals and poly-clinics have been reorganized to meet the requirements of developing realities and heath care system. Ri-hospitals, cornerstone for primary health care in rural areas are made of specialized departments like internal, pediatric, surgical, obsto-gynecological, Koryo traditional and dental ones and laboratories and inpatient rooms.

Poly-clinics, cornerstone for primary health care in urban areas comprise of mainly household doctor's departments and other specialized departments like internal, obsto-gynecological, surgical, dental and laboratory ones.

The working staffs of factories and enterprises are served both by workshop doctor system of industrial hospitals and household doctor system of residential institutions.

The recent increase of household doctors shows that the Government put great efforts on daily health care activities including the prevention and health care for people at PHC level.

Ri-hospitals and poly-clinics undertake the general medical practice, some specialized services and preventive care such as health promotion, vaccination, emergency call, home visit, consultations and delivery.

MoPH has achieved a lot of success in renovation of preventive and curative facilities and improvement of medical care

According to the results of survey jointly conducted in April 2015 by MoPH and WHO on renovation for health facilities and improvement of the health care during the period of 2008-2014, the health facilities and equipments have been so much rehabilitated and modernized and also, indicators reflecting the level of doctors and the health care have been greatly improved.

Many successes have been achieved in the activities for utilization of natural factors like mineral spring resources including hot spring and mineral water, mud, and good climate abundant in the country.

In accordance with national policy for utilization of mineral spring resources found in everywhere throughout the country, a lot of sanatoria including Kim Jong Suk Sanatorium was modernized and, right now , hundreds of sanatoria proceed the activities for treatment and prevention of chronic diseases and physical exercises in the period of rehabilitation of diseases.

On the other hand, the national policy for demonstrating the superiority of Koryo traditional medicine by combining and developing the Koryo medicine and Modern Medicine have been carried out by making the Koryo traditional treatment method scientific and modernized and searching and using the Koryo medical herb. In particular, the proportion of utilization of Koryo treatment approach at city(district), county health facilities while the level of application of Koryo traditional treatment method is more than 50% at PHC level.

The state conducts the health work as a widespread campaigns based on the recognition that the preventive medicine is successfully implemented only with all population involvement.

Hygienic promotion activities which play an important role in preventive medicine are performed by mainly the household doctors as their routine work; health facilities at all levels also plan health promotion targeting outpatients visiting the facilities. Sometimes personals of education institutions, students at universities, pupils at senior middle schools also are mobilized in this work.

The education of hygienic common sense and the health knowledge for the pupils in the education institutions are as follows; to provide the education of basic hygienic common sense and practice in accordance with the features of ages in the period of kindergarten and primary schools, to provide the education with the subject of "Hygiene Reader" and by fixing the teaching time.

The mass media used in health education and sanitary propaganda are "Central TV Program", "Education and culture TV program", broadcasting and various forms of newspapers including the "Public Health".

MoPH and authorities in health sector have given priorities strengthening of regularly reporting system and have mobilized prevention and treatment facilities and health research

institutions for the concrete and precise analysis and evaluation of population health status through diseases screening by region.

Life expectancy is major indicator to evaluate the health status of population. Recent continuous increase in the life expectancy is also one of the major successes achieved in health sector due to decrease of mortality rate of population. As of 2008, the life expectancy was 69.4 years; 65.6 years in male and 72.9 years in female according to population census. The average life expectancy was revealed to be 70.3 in 2010 estimates and 71.7 with 67.1 for men and 74.5 for women in 2013 while 72.7 with 68.4 for men and 75.6 for women in 2015. This was an increase of 1.4 years compared to 2010.

This shows that the life expectancy remarkably dropped in mid-1990s has been rapidly increasing in recent years although average one did not reach to the level by the end of 1980s which was 74.5 years

9. Five-year Strategic Plan for Health Development

Along with the changing environment where every sector of people's economy is rapidly developing for achieving the targets of National Five-year Strategic Plan for Economic Development set forth in the 7th Congress of the Workers Party of Korea, the Government indicated the overall health goal to strengthen the most people-centred health system, to reach the health indicators including life expectancy and communicable disease prevention rate by globally advanced level and to provide the people with more hygienic and cultural life condition and environment.

The main target of Five-year Strategy for Health Development is to rise the life expectancy, IMR, proportion of births attended by skilled personnel, communicable disease prevention rate, and TB incidence rate and prevalence rate above the maximum level which was already achieved in 1980s or early 1990s. In order to achieve these targets, hygienic and anti-epidemic institutes should be modernized, prevention of communicable disease focused, morbidity and mortality be dramatically decreased by strengthening the preventive institution-like health care service. In particular, it is important that household doctors should take preventive interventions for various kinds of diseases based on the age-specific or body constitution-specific features of the people and provide the high quality health care with accountability by strengthening the doctor section system.

Juche-oriented Medical science and technology should be developed rapidly. A wide range of latest medical science and technology should be introduced proactively, Koryo medicine put on a scientific basis, telemedicine system completely equipped and quality of health care including emergency health care be maintained at high level. Pharmaceutical and medical appliances factories have to be updated and efficacious medicines, advanced medical facilities and appliances, and medical supplies should be produced to satisfy the demands.

County people's hospital should be furnished as health-care center in the region and the logistic support strengthened for ri people's hospital or clinics.

Guidance and leadership for health should be enforced.

10. International cooperation for health

The government recognizes that international corporation and exchange play important role in public health development because there are the differences in natural economic condition, health development level and medical scientific technical development, production and needs for drugs in every country. In this regard, the government proposed the bilateral and multilateral cooperation with other countries and the international organizations as the important health policy.

The government annually sends many doctors, researchers, postgraduates, trainees, and study tourists to other countries to exchange the medical scientific technology and learn the advanced techniques.

The government recognizes the important role of WHO in global development of public health and the technical cooperation and put great efforts to strengthen the relationship with WHO; the largest international governmental organization of health sector in the world.

Especially, the government focuses on the cooperation with the WHO by implementing the "Mid-term Health Development Strategy 2016-2020" which was made jointly with our country and WHO.

Recently, essential drugs provided through international cooperation with international organizations including WHO and UNICEF has been very useful for treatment for people.

The Government ensured that international collaboration was strengthened to rehabilitate the medical service institutions in order to meet the need of new era. During 2006 - 2014, operation theatres, delivery rooms and emergency rooms, 40 laboratories and 35 blood units were rehabilitated or updated in 120 county people's hospitals.

1 200 ri clinics or people's hospitals were renovated during 2007-2014 and renovation of 5 provincial maternity hospitals and 5 provincial pediatric hospitals have been carried out.

In addition, the international organizations including the UNICEF, UNPFA, GAVI Alliance, WFP and GFTAM, non-governmental organizations, the humanitarian aid agencies have contributed to facilitating collaboration and cooperation in health sector recent years.

The government respects the sovereignty of other countries; consistently advocates the international cooperation and exchange for the health on the principle of mutual equality, benefit and noninterference in each other's internal affairs; and embodies it as the main principle in external activities.

Annex: Main Statistical Indicators

Indicator	Unit	Year																
		1997	1998	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Demography and economy																		
Number of population	per																25 030 070	
Density of population	per/㎢																217	
Population proportion under 15 years	%																20.6	
Population proportion over 60 years	%																13.6	
Urban population proportion	%																61	
Total fertility rate	per															1.9		
Crude birth rate(per 1000)	〃															13.74		
Crude death rate(per 1 000)	〃															8.33		
National population growth rate (per 1 000)	〃															5.41		
Gross Domestic Production per capita	$					545		683		798		904		1 024	1 053			
Education																		
Adult literacy rate	%																100	
Net enrolment ratio in primary and secondary education	%								98									
Student rate among population over 15years	%															8.1	8.1	
Proportion of graduated the middle school among population over 15years	%															66.1	66.1	
Proportion of graduated the college among population over 15years	%															10.8	10.8	
Proportion of graduated the university among population over 15years	%															15	15	
Indicators for child and maternal health																		
Infant mortality (per 1000 live births)	per		23.5	22.8	22.7	21.1	19.5		19.3		18.8		16.7		14.2	12.8		
Under 5 mortality (per 1000 live births)	per			47.6	48.4	45.5	38.7		26.7		25.7		22.7		20	17.7		
Maternal mortality ratio (per 100,000)	per	105			97		90		85.1		76		68.1		62.7	58		
Proportion of delivery at institution	%										87.9				90.1			
Proportion of delivery at home	%										12.6				8.9			
Percentage of maternal death from home delivery	%									61.7								
Percentage of maternal death from Institutional delivery	%									32.4								

Indicator	Unit	Year																
		1997	1998	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Underweighted rate below degree 2 among children under 5 years	%		60.6	27.9						18.8			15.2					9.3
Stunted rate with degree 2 among children under 5 years	%		62.3	45.2						32.4			27.9					19.1
Wasted rate below 2 standard deviation under 5 years	%		15.6	10.4						5.2			4					2.5
Low Birth Weight Ratio	%		9	6.4	6.7	6.5	6.3			5.7			4.94		4.7			
Proportion of Birth Attended by Skilled Health Personnel	%	87.9			96.7	96.9	97.1	99			97.3		99.1		99.9		99.9	
Contraceptive prevalence rate among women	%	67.3			68.6	70.1	69.1				70.6	70.7			78.2			
Unmet need for family planning	%				16.7	9.2	9.6								7			
Antenatal Care Coverage by Frequency (%) (1-3times)	%	5.9			5.3	5	6.1			6.5			6.1		8.2			
Antenatal Care Coverage by Frequency (%) (more than 4 times)	%	94.1			94.2	95	92.7			93.5			93.9		91.8			
Antenatal Care Coverage by Frequency (%) (Unknown)	%				0.5		1.2											
Rate of Pregnant women who ever Visited Hospital for Antenatal Care	%			97.5	98.7	98.6	99.4				99.8				99.7			
Proportion of postnatal care provided before 42 days after delivery	%														98.7			
Proportion of postnatal care provided before 24 hours after birth	%														76.2			
Proportion of registered women by gestational age (over 3months)	%				41.9	41.6	38.7				19.1	18.4			15			
Proportion of registered women by gestational age (before 3months)	%				58.1	58.4	61.3				80.3	81.6			85			
Proportion of registered women by gestational age (unknown)	%										0.6							
Awareness Rate of family planning among married women at reproductive age (awareness about contraception)	%	96.4			99.7	99	99.6				99.9				99.8			
Awareness Rate of family planning among married women at reproductive age (more than 4 modern methods)	%	60.4			73.1	73.2	77.3					69.1			99.5			

Indicator	Unit	Year																
		1997	1998	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Human Resources for Health and Improvement of Health Care Services																		
Number of doctors	per																93667	
Number of pharmacists	each																10094	
Doctors per 10, 000 population	each																37	
Doctor+ pharmacists per 10,000 population	each																41	
No. of Medical Universities	each																15	
No. of Nursing schools	each																66	
No. of Central and provincial hospitals	each																136	
No. of hygienic and anti-epidemic institutes	each																235	
No. of Preventive Institution	each																55	
No. of sanatoria	each																682	
No. of City/County/Ri hospitals	each																1 694	
No. of Poly-clinics/clinics	each																6 263	
No. of Blood transfusion institutions	each																12	
State expenditure on health as % of total state budgets	%			5.9											6.4		6.6	
Hygienic and Anti-epidemic activities																		
BCG coverage	%																97.4	
Hep B coverage	%																98.3	
OPV 3 coverage	%																98.7	
Penta Vaccine 3	%																95.7	
TT2 coverage	%		4.6		38.9	61.2	67.4						97.8		98.1		98.5	
No. of HIV/AIDS test	per															103205		
Proportion of over 15 population with full awareness about HIV/AIDS (male)	%					32.9	50.3			-		38						
Proportion of over 15 population with full awareness about HIV/AIDS (female)	%					22.8	39.8			36.9		35						
Proportion of over 15 population with full awareness about HIV/AIDS (Total)	%																	55
Prevalence of malaria (per 100,000)	per		9.3	890.4	1 098.9	143.2	39.1		97.3		63.2		93		44		20.2	
Awareness rate of malaria	%															99.6		
Proportion of people with correct knowledge on transmission route	%															97.3		

Indicator	Unit	Year																
		1997	1998	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Proportion of people with accurate awareness on the prevention approach of Malaria	%															96.7		
Proportion of HHs using bed nets	%															68.7		
Proportion of children under 5 using bed nets	%															98.3		
HHs with tap water -service (urban)	%														89			
HHs with tap water -service (rural)	%														76			
HHs with tap water -service (Total)	%														84.2			
Proportion of population using as improved sanitation facility	%														63.2			
Proportion of population using as proper waste disposal facility	%					99.2												
Proportion of HHs with toilet and bathroom (urban)	%								92									
Proportion of HHs with toilet and bathroom (rural)	%								83									
Proportion of HHs with toilet and bathroom (total)	%									83.2								
pH	average														7.7			
Turbidity (NTU)	average														1.5			
Sulfate (mg/L)	average														26.12			
Nitrate (mg/L)	average														0.05			
Nitrite (mg/L)	average														0.001			
Total iron (mg/L)	average														0.02			
Fluorid (mg/L)	average														0.48			
Arsenic (mg/L)	average														0			
Chloride (mg/L)	average														23.67			
Pumping(average # of colonies)	each/ml														13.2			
Tap water (average # of colonies)	each/ml														26.6			
Underground water (average # of colonies)	each/ml														38.9			
Water well (average # of colonies)	each/ml														82.8			
Tube well (average # of colonies)	each/ml														52			
Spring (average # of colonies)	each/ml														2			
Stored water (average # of colonies)	each/ml														99.4			
Water source (average # of colonies)	each/														26.6			

Indicator	Unit	Year																
		1997	1998	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	100ml																	
Pumping (average # of colonies)	each/ 100ml														0			
Tap water (average # of colonies)	each/ 100ml														0.14			
Underground water (average # of colonies)	each/ 100ml														0.2			
Water well (average # of colonies)	each/ 100ml														1.1			
Tube well (average # of colonies)	each/ 100ml														0.3			
Spring (average # of colonies)	each/ 100ml														0			
Stored water (average # of colonies)	each/ 100ml														1.65			
STD infection rate before population-based deworming (pre-school children)	%															26.1		
STD infection rate before population-based deworming (schoolhood children)	%															31.2		
STD infection rate before population-based deworming (adults)	%															30.8		
Non-communicable diseases																		
Hypertension prevalence among male (25-64 yrs)	%									20.4								
Hypertension prevalence among female (25-64 yrs)	%									17					14.12-14.94			
Over 35 yrs (total)	%																19.9	
Hypertension prevalence among male	%																13.1	
Hypertension prevalence among female	%																16.1	
Total	%																	
Average BMI (male)	%									21.6							22.4	
〃 (female)	%									21.3							22.8	
Proportion of population with BMI higher than 25 (male)	%									4.1							5.4	
Proportion of population with BMI higher than 25 (female)	%									4.7							9.94	

Indicator	Unit	Year																
		1997	1998	2000	2002	2004	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Proportion of population with BMI higher than 23	%														22.83-26.02			
Prevalence of diabetes	%														3.05-3.9			
Prevalence of diabetes (male)	%																3.2	
Prevalence of diabetes (female)	%																3.5	
Cholesterol level higher than 6.6 ㎖/L	%														1.33-1.37		1.4	
Excessive alcohol consumption rate (over one bottle at a drinking)	%									25.9							17.5	
Prevalence rate of drinking alcohol among male (over 18 yrs)	%																43.7	
Prevalence rate of drinking alcohol among female (over 18 yrs)	%																2.2	
Total (over 18 yrs)	%																20.9	
Smoking prevalence of male adult	%									52.3				43.9				
Smoking prevalence of male adult (Urban)	%													43.2				
Smoking prevalence of male adult (Rural)	%													44.5				
Health status of population																		
Life expectancy(Total)	yrs								69.4		70.3			71.7		72.7		
Life expectancy(male)	yrs								65.6					67.1		68.4		
Life expectancy(female)	yrs								72.9					74.5		75.6		

Table1. Pulmonary TB prevalence rate bacteriologically confirmed among population aged 15 and over

Category	Analysis(Calculation) by enumeration area	Multiple value setting +reversed probability Weighting(presumed)
	Pulmonary TB prevalence rate (per 100 000 population)	Pulmonary TB prevalence rate (per 100 000 population)
Total	567(510-631)	587(520-655)
Male	892(778-1005)	917(783-1052)
Female	309(249-369)	319(256-382)
15-24	146(72-220)	155(70-240)
25-34	525(390-660)	579(410-748)
35-44	732(585-879)	764(611-916)
45-54	825(665-984)	877(705-1049)
55-64	591(410-771)	595(410-781)
≥65	450(283-617)	444(264-624)
Urban	571(490-651)	577(489-665)
Rural	627(524-730)	659(555-764)
Grouped living units	96 (0-205)	102(0-219)

Table2. Proportion of smoking status of population aged 15 and over by age and sexuality (2016)

Group		Yes		No smoking		Cessation	
		Number	%	Number	%	Number	%
15-24	Male	876	19.7	3571	80.3	2	0.04
	Female	0	0.0	5851	100.0	0	0.00
	Subtotal	876	8.5	9422	91.5	2	0.02
25-34	Male	2192	45.4	2631	54.4	9	0.19
	Female	0	0.0	6324	100.0	0	0.00
	Subtotal	2192	19.6	8955	80.3	9	0.08
35-44	Male	3007	47.6	3297	52.2	14	0.22
	Female	0	0.0	6856	100.0	0	0.00
	Subtotal	3007	22.8	10153	77.1	14	0.11
45-54	Male	2762	46.2	3195	53.5	16	0.27
	Female	0	0.0	6752	100.0	2	0.03
	Subtotal	2762	21.7	9947	78.2	18	0.14
55-64	Male	1500	45.7	1771	53.9	12	0.37
	Female	4	0.1	3741	99.8	4	0.11
	Subtotal	1504	21.4	5512	78.4	16	0.23
65 and over	Male	761	34.9	1409	64.7	9	0.41
	Female	4	0.1	4110	99.9	1	0.02
	Subtotal	765	12.2	5519	87.7	10	0.16
Total	Male	11098	41.1	15874	58.7	62	0.23
	Female	8	0.02	33634	99.96	7	0.02
	Subtotal	11106	18.3	49508	81.6	69	0.11

Table 3. Routine Immunization Coverage by Province/State for 2016

Province Name	BCG (%)	Hep B Birth Dose (%)	DPT1# (%)	DPT 3# (%)	OPV3 (%)	MCV1* (%)	MCV2* (%)
Pyongyang	98	98. 8	97. 9	96. 7	98. 8	98. 7	98. 5
S. Phyongan	97. 5	98. 4	97. 2	95. 6	98. 7	98. 5	98. 1
N. Phyongan	97. 3	98. 2	96. 8	95. 3	98. 6	98. 7	98. 2
Jagang	97. 2	98. 1	96. 9	95. 3	98. 6	99	98. 1
S. Hwanghae	97. 4	98	97	95. 3	98. 7	98. 7	98. 5
N. Hwanghae	97. 3	98. 1	97. 4	96. 1	98. 8	98. 7	98. 1
Kangwon	97	98. 2	97. 2	95. 7	98. 9	98. 6	97. 9
S. Hamgyong	97. 9	98. 2	97	95. 5	98. 6	98. 6	98. 3
N. Hamgyong	96. 5	98	96. 8	95. 2	98. 8	98. 5	98. 2
Ryanggang	96. 3	98. 1	97	95. 5	98. 4	98. 6	98. 1
Nampho	97. 8	98. 3	97. 3	95. 9	98. 4	98. 5	98. 2
Total	97. 4	98. 3	97. 2	95. 7	98. 7	98. 7	98. 2