Action Plan for Malaria Elimination 2010

질병관리본부

KOREA CENTER FOR DISEASE CONTROL & PREVENTION

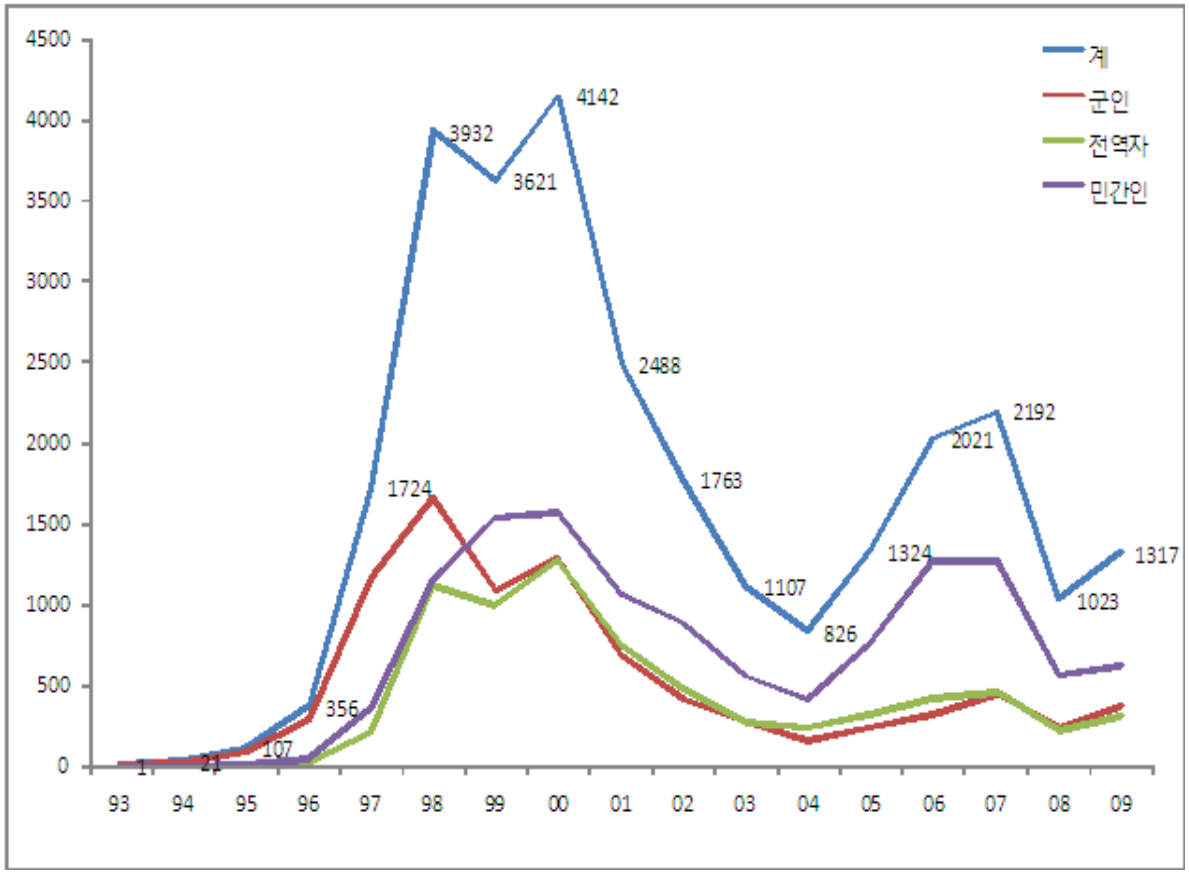
Contents

1. Malaria Situation in the Republic of Korea

Reported Malaria Cases According to Military Service Status (Excluding Imported Cases):

Year	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09
Total cases	1	21	107	356	1,724	3,932	3,621	4,142	2,488	1,763	1,107	826	1,324	2,021	2,192	1,023	1,317
Active-duty Soldiers	1	18	88	285	1,156	1,657	1,084	1,289	673	406	273	158	233	311	446	236	364
Reserves	-	1	12	25	207	1,127	996	1,273	748	472	274	244	322	432	463	221	316
Civilians	-	2	7	46	361	1,148	1,541	1,580	1,067	885	560	424	769	1,278	1,283	566	637

*The statistics for year 2009 is provisional and is subject to change



※ The blue line indicates the total cases
※ The red line represents active soldiers
※ The green line represents reserves
※ The purple line represents civilians

Trends in Malaria Cases

- Nationwide, the reported incidence of laboratory-confirmed cases has declined four consecutive years from 2001 to 2004, but increased from 2005 to 2006 to 2007 at 60.3%, 52.7%, 8.5% each compared to previous years. But after a 53.3% drop in number of cases in 2008 compared to 2007, a 28.7% increase occurred in 2009 due to surge of cases in soldiers.

- Analysis of the 2009 data shows an increased number of cases in civilians, reserves and active-duty soldiers, compared to the previous year by 12.5%, 43.0% and 54.2% respectively.

- Patient incidence (per 100,000) was highest in Ganghwa county (68.4) followed by Cheorwon County (65.0), Yeoncheon County (44.1), Ongjin County (39.3), Paju City (24.6) Gimpo City (18.8) and Dongducheon City (14.1) in 2009.

- Sex distribution was eminent as patient incidence (per 100,000) was about three times higher in males (1.9) than in females (0.6).

- In male civilians, the age group which were most affected were 40 - 50 (147 cases) followed by men 50 - 60 (96 cases), 20 to 30 year olds (82 cases) followed by 30 to 40 year olds (73 cases). In female civilians, malaria occurred most in the 40-50 age bracket (37 cases) followed by 50 to 60 (29 cases), and 20 to 30 (23 cases).

Financing for Malaria

Annual funding for malaria control Korean Won (millions)

Fiscal Year	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10
Total Budget	437	446	446	383	373	337	337	617	713	641

Stratification of Transmission Risk Areas in Civilians in 2009

Classification		Cases per 100,000 Population	Classification		Cases per 100,000 Population
Transmission Risk Areas (7)	Yeoncheon County	44.1	**Potential Transmission Risk Areas (15)**	Goseong County	9.9
				Pocheon City	7.5
	Cheorwon County	65.0		Hwachun County	4.1
				Inje County	3.2
	Ganghwa county	68.4		Incheon West District	4.5
				Incheon Central District	6.6
	Paju City	24.6		Incheon East District	6.6
				Ilsan East District	7.6
	Gimpo City	18.8		Ilsan West District	9.7
				Deogyang District	6.4
	Ongjin County	39.3		Yangju City	5.0
				Uijeongbu City	3.2
	Dongducheon City	14.1		Gapyeong County	0.0
				Chuncheon City	0.0
				Yanggu County	0.0

Trend of Transmission Risk Areas (by designation)

2000: 17 cities and counties
2001 & 2002: 12 cities and counties
2003: 9 cities and counties
2004: 7 cities and counties
2005: 6 cities, counties and boroughs (districts)
2006: 7 cities, counties and boroughs (districts)
2007 & 2008: 13 cities, counties and boroughs (districts)
2009: 6 cities, counties and boroughs (districts)
2010: 7 cities, counties and boroughs (districts)

- The range (number) of transmission risk areas has been expanding every year from 1993 to 2000.

- The number of transmission risk areas decreased from 12 in 2001 to 6 in 2005. After an insignificant rise to 7 in 2006, the number of transmission risk areas increased to a total of 13, in 2007 and 2008, including Paju City etc., due to a surge in number of cases and the revision of administrative districts, where Ilsan District was separated into Ilsan East District and Ilsan West District.

- It also contained one hyper-transmission risk area (defined as more than 100 patients per 100,000 residents), which was Ganghwa County.

- 9 administrative districts, including Hwachun County, were classified as potential transmission risk areas.

- A plunge in number of cases in 2008 resulted in a decrease in number of transmission risk areas to 6, in 2009.

- The number of transmission risk areas increased to 7 in 2010, resulting from adding Dongducheon City, once a potential transmission risk area, to the transmission risk area. There were no so-called hyper-transmission risk areas after Gwanghwa County was rearranged into the transmission risk area.

Summary of Malaria Epidemiologic Features in 2009

- The number of cases soared among soldiers (active-duty and reserve) posted along the DMZ (Demilitarized Zone).

- The number of patients in active-duty soldiers was highest in Gyonggi Province (218) followed by Gangwon Province (109) and Incheon Metropolitan Area (15). Gangwon and Gyonggi, which are provinces adjacent to the DMZ, observed a 76% and 49% increase in number of cases compared with the previous year, respectively.

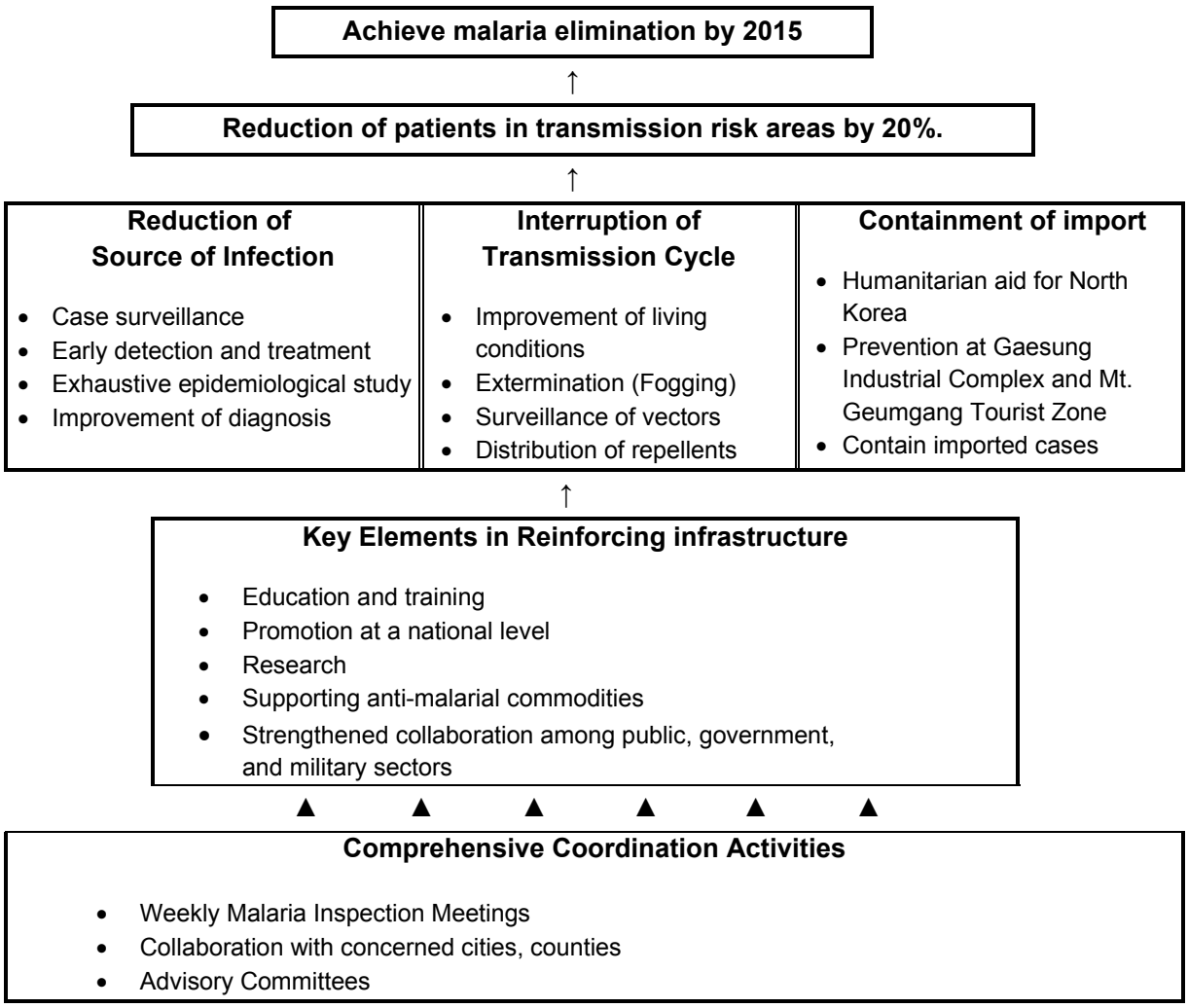
- Incidence in civilians rose in Cheorwon, Goseong, Gimpo, Ilsan East and West District, Pocheon and Dongducheon, while falling in Ganghwa, Yeoncheon and Paju.

- The number of patients in civilians was highest in Gyonggi (321) followed by Incheon (125) and Seoul (115). The number of cases in reserves was high in Gyonggi (66) and Seoul (47) which leads us to infer that the reserves returned to the metropolitan areas to continue studies or work.

- 76% of all malaria cases occurred from June to September, and civilians were most affected in August while the incidence was highest in July for reserves and active duty soldiers.

2. Long Term Goals and Strategies for Malaria Elimination

Basic Objectives for Malaria Elimination



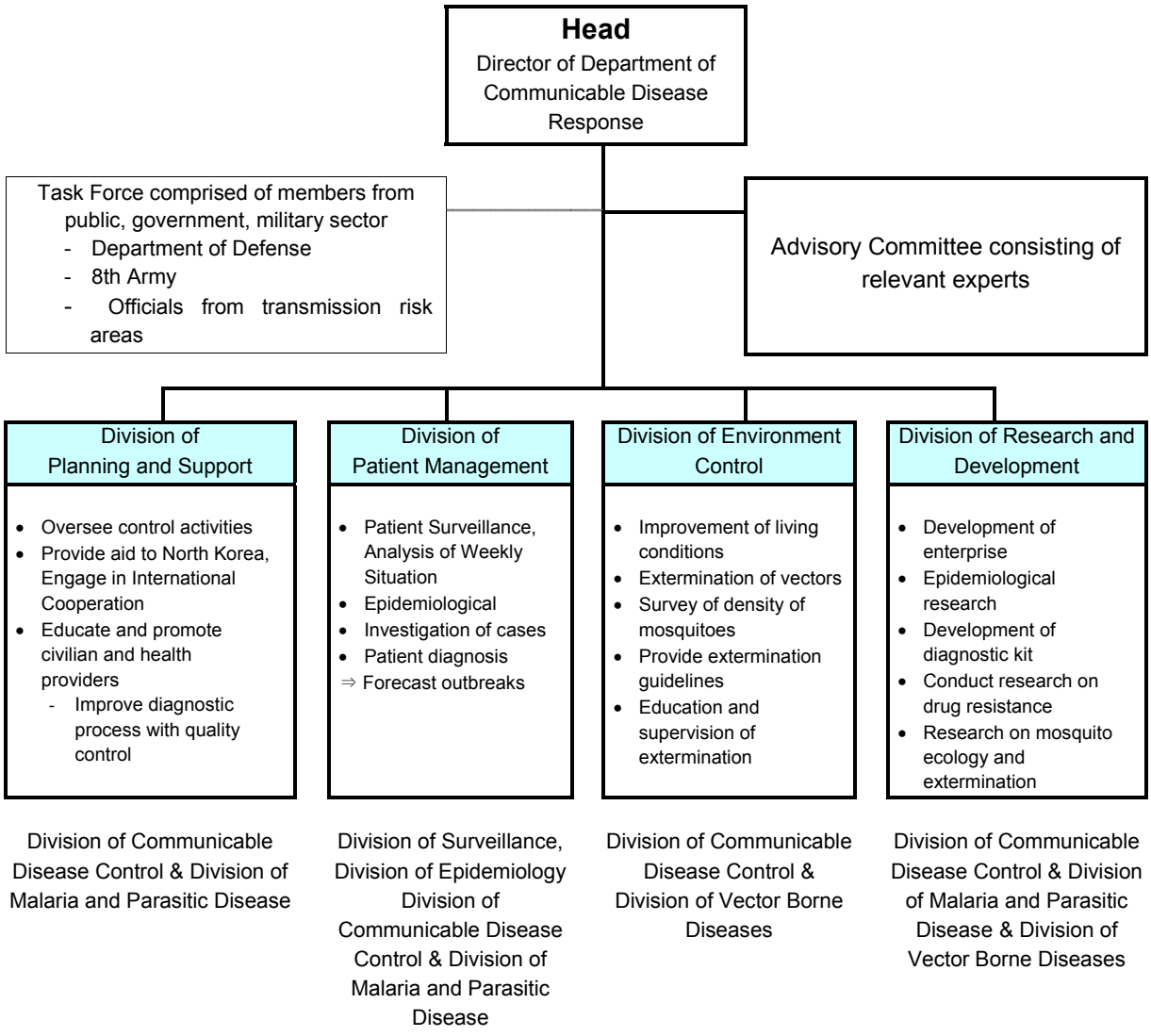
Through adopting a three pronged approach (reduction of source of infection, interruption of transmission cycle, containment of import) based on proper infrastructure, the Korean government hopes to achieve malaria elimination by 2015.

Strategies for implementing major activities are:

(i) Strengthening infrastructure for malaria prevention and control which includes:
  (a) Fortifying capacity for surveillance, diagnostics and training human resources
  (b) Implementation of effective insecticide spraying
(i) Maximizing efficiency by scaling up malaria control activities in transmission risk area
(ii) Cutting off transmission through patient detection and treatment
(iii) Promote control measure outcome through partnerships, holding joint workshops with the National Malaria Elimination Task Force, academia and the government
(iv) Intensifying supervision of active duty soldiers and reserves which includes:
  (a) Collaboration with the Department of Defense to educate active-duty soldiers and reserves
  (b) Aiding the military with anti-malarial tools

The National Malaria Elimination Task Force

Organization chart:



Past Activities of Focus in the Context of Malaria Elimination

- Anti-malarial activities in the past, from years 1993 to 1998, were focused and limited on patient management
  (i) Early diagnosis and early treatment
  (ii) Supporting anti-malarial tools and medication to Public Health Centers in transmission risk areas

- Establishment and Implementation of Comprehensive Prevention and Patient Care
  (i) Operation of The Malaria Eradication Enterprise Agency and the Advisory Committee
  (ii) Focusing implementation on environment management, education, promotion and supporting malaria control in transmission risk areas
  (iii) Making efforts to shorten the time required until diagnosis
  (iv) Providing education to the person in charge within the public health center with emphasis in quality control
  (v) Intensifying promotion targeting local residents and medical institutions

- Humanitarian aid for North Korea in 2001
  Providing aid both in-kind (anti-malarial medication, etc.) and in cash (for training staffs carrying out anti-malarial activities), using Korea CDC's budget and the South and North Korea Collaboration Fund)

Donations made to North Korea to support malaria control efforts (in thousands USD)

구분	'01	'02	'03	'04	'05	'06	'07	'08	'09
Total	**530**	**619**	**700**	**700**	**877**	**1,136**	**1,412**	**1,222**	**1,096**
In Kind	490	594	671	670	791	1,060	958	1,103	1,016
Cash	40	25	29	30	86	76	454	119	80

※ Donations made in kind include cash payed for shipment and administration.

- Participation in Bi-Regional Meetings convened by the WHO **from 2003 to 2010.**
  (i) Sharing malaria control strategies among East Asian countries such as North Korea and China
  (ii) Sharing malaria data of North Korea and discussing support through South-North Korea Technical Collaboration

3. Summary of Progress in Malaria Control Activities in 2009

Strengthening of sustainable prevention in risk areas which include:

- Weekly Malaria Inspection Meetings held by the Director of the CDC with relevant authorities present: The result of the meeting is reflected in the future malaria elimination strategies and distributed to the transmission and potential transmission risk areas

- Revision and dissemination of National Malaria Control Strategy 2009

- Supporting malaria prone areas (22 cities and counties located in Incheon, Gyonggi and Gangwon) with budget and anti-malarial commodities through subsidization from the National Treasury (148 million Korean Won) and budget reallocation (240 million Korean Won)

- Field Inspection and providing consultation in military units with high incidence of malaria; Offering consultation on disinfection and delivering New Jersey light traps

- Hosting Malaria Elimination Field Inspection Meeting; held in March at Yeoncheon Public Medical Center, to provide consultation on and to inspect major malaria control activities

- Field Inspection at transmission risk areas including military units; in July at Gangwon and Gyonggi Provinces with authorities from the Centers for Disease Control and Prevention, directors and relevant personnel from public health centers within the transmission risk areas, commander of medical brigades convened to discuss the malaria burden, current status of malaria control, future activities of priority and matters that require cooperation with the military units

- Inspection of high transmission military division (7th Division) located in the Hwachun County; conduct inspection on supplied New Jersey light traps operation and identify mosquito collection status

- Provide Consultation to the Department of Defence on supervision of reserves with history of malaria (Minister's order)

- Carrying out education on malaria diagnostics; intended for lab technicians at public health centers and Research Institute of Public Health and Environment to conduct quality assessment on diagnostic capacity

- Analysis of epidemiologic characteristics of domestic malaria – which include a complete breakdown of demographics, suspected route of infection, and area of infection, and detailed analysis on recrudescence and re-infection of patients based on case investigation

- Conduct forecast on malaria prevalence by investigating vector density and vector infection rate with Plasmodium

- **Fortifying Prevention at Gaesung Industrial Complex and Geumgang Mountain Tourist Zone**

    - Hosting ‘Meeting with Agencies concerned to control and prevent malaria and other communicable diseases in the Gaesung Industrial Complex’ ; convened on May 8th to discuss support of promotion material and medication at Gaesung Industrial Complex and Geumgang Mountain Tourist Zone after Education and Field Inspection at Gaesung Industrial Complex

- **Providing aid to North Korea and promoting joint operation against malaria**

    - Participation at the South-North Korea Technical Consultation Meeting on Malaria in the North held by the WHO in New Delhi from April 21st to 26th, to discuss support of anti-malarial activities in the North

    - Delivering 1.096 million US dollars worth of bed nets, insecticides, anti-malarial medication and diagnostic reagents

4. Priority Activities Regarding Malaria Control Planned in 2010

Strengthening for sustainable prevention in risk areas which includes:

- Weekly Malaria Inspection Meetings held by the Director of the CDC with relevant authorities present: The result of the meeting is reflected in future malaria elimination strategies and distributed to the transmission and potential transmission risk areas.

- Revision of National Malaria Control Strategy 2010

- Supporting malaria prone areas (22 cities and counties located in Incheon, Gyonggi and Gangwon) through subsidization from the National Treasury (148 million Korean Won) and budget reallocation (220 million Korean Won)

- Reinforcing prevention of malaria in soldiers stationed along the demilitarized zone through collaboration with the Department of Defence:
    - Field Inspection of military units with high prevalence of patients and local Public Health Centers
    - Supplying commodities such as electronic mosquito repellents and bed nets to reduce patients
    - Search risk factors within units
    - Strengthen collaboration with relevant agencies like Department of Defence, local units and Public Health Centers

- Hosting Malaria Elimination Field Inspection
    - Participation of directors and relevant personnel from public health centers and military units within the transmission risk areas
    - Discuss activities and matters that require cooperation with the military units
    - Provide Consultation to the Department of Defense on supervision of reserves with history of malaria

- Increase the quality of epidemiological investigation

- Strengthening diagnostic capacity and ensuring reliability
    - Operating National Vivax Laboratory and standardization of diagnostic procedure
    - Receive accreditation on malaria diagnosis from SOP (Standard Operating Procedure)
    - Assess effectiveness of diagnostic kit
    - Assessment of ELISA to improve its usage in malaria diagnosis

- Utilizing pro-ecological methods to control vectors

- **Fortifying Prevention at Gaesung Industrial Complex and Geumgang Mountain Tourist Zone**

    - Cooperation with Agencies concerned to control and prevent malaria and other communicable diseases in the Gaesung Industrial Complex
    - Support of promotion material and medication
    - Conduct Education and Field Inspection at Gaesung Industrial Complex

- **Providing aid to North Korea and promoting joint operation against malaria**

    - Participation at the ‘South-North Korea Technical Consultation Meeting on Malaria in the North held by the WHO to discuss support of anti-malarial activities in the North
    - Plan to deliver 1.136 million US dollars in kind and 78,830 US dollars in cash

5. Goals and Detailed Malaria Control Activities in 2010

The national goals in 2010 include:

- 20% Decrease of Overall Cases Compared to 2009

  North Korea reported 23,409 patients in 2008, which was 3.1 times higher than the year before and 41 times higher than the number of civilian patients (566) in South Korea in 2008. The surge of patients in North Korea is thought to result in increased number of patients in South Korea, in 2009 after 6 months to 1 year, concentrated in areas adjunct to DMZ. These observations leads the authorities to intensify 2010 anti-malarial activities focusing on prevention and control in military forces with experience in DMZ areas (active-duty or reserve) and civilians residing in high risk areas (especially in vicinity to military units) in order to achieve the goal of decreasing malaria cases by 20% compared to 2009.

- Reinforcing Prevention of Malaria in Soldiers Stationed Along the Demilitarized Zone through Collaboration with the Department of Defense

  - Strengthening collaboration with relevant agencies such as the Department of Defense, local military units and public health centers manifested through participation of military authorities concerned in the Malaria Elimination Enterprise Agency, advisory committees, on-field meetings and sharing information
  - Conducting field inspection on military units with high prevalence of patients
  - Furnishing anti-malarial commodities such as Long-lasting insecticide-treated nets (LLIN), electronic mosquito repellants, diagnostic kits and education, promotion material

- Intensifying Surveillance and Prompting Rapid Diagnosis and Treatment in Transmission Risk Areas

  - Intensifying outbreak surveillance, early diagnosis and treatment by providing Rapid Diagnostic Kits in remote transmission risk communities inducing rapid diagnosis and early detection of patients through education of residents
  - Securing smear examination capacity of Public Health Centers

- Strengthening Diagnostic Capacity and Securing Reliability

  - Achieved through operating the National Vivax Laboratory and standardization of diagnostic procedure such as receiving SOP accreditation on microscopy and malaria diagnosis using PCR. Also assessing effectiveness of diagnosis kit with emphasis on malaria antigens and evaluating effectiveness of ELISA.
  - Educating malaria diagnosis methods and conducting quality assessment on relevant personnel at public health centers, Research Institute of Public Health and Environment and military units.

- Utilizing ‘Mapping’ in Transmission Risk Areas

  - Produce maps indicating outbreak of cases and utilize them in active surveillance, disinfection, educating residents and case investigation. Also used to assist field inspection in transmission risk areas.

- Applying Pro-ecological and Efficient Vector Exterminators

    - Activities in this specific goal include prioritized incorporation of transmission risk areas in the so-called 'Innovative Field Vector Mosquito Extermination Project'. It also contains adequate amalgamation of insect and larva extermination suitable with local ecological environment. Other activities are maintaining supervision of suspected source of vectors such as shed or barns, exploring new ways for effective and efficient extermination methods and combined use of chemical and physical extermination methods.

- Intensifying Epidemiological Investigation in Confirmed Patients

    - Activities include the following:
        (i) scaling up the quality of epidemiological investigation expected to be achieved by attaining the reporting rate of over 95%, executing on-line reports and educating epidemiological investigation staff;
        (ii) introduction of quantified and scientific factors in the process of determining the transmission route and area;
        (iii) in depth analysis and research of epidemiological characteristics through obtaining transmission route and patient data, performing cluster analysis, intensifying epidemiological investigation on cases occurring in low transmission risk areas and conducting research on malaria recurrence and reinfection;
        (iv) intensifying in depth epidemiological investigation which activities include investigation of malaria cases in low transmission risk areas, inquiry of cases lacking association with high transmission risk areas and and co-analysis of epidemiological characteristics of recurrent and re-infected cases with the Division of Malaria and Parasitology.

- Strengthening Promotion of and Collaboration with Residents and Medical Institutions

    - Activities include: 1) development and distribution of promotional and educational materials; and 2) preparation and implementation of educational and promotional programs according to local differences.

- Reinforcing the Activities of the National Malaria Elimination Enterprise Agency and Members of The Advisory Committee

    - Reinforce the activities and the role of the Malaria Elimination Enterprise Agency and promote collaboration between national and regional elimination enterprise agencies.

- Sustaining Efforts to Shorten Time Until Diagnosis

    - The activities include the following:
        (i) Offer effective education and promotion to residents and public institutions to facilitate early diagnosis and treatment;
        (ii) Promotion and seeking collaboration with primary medical facilities to improve the rate of early diagnosis;

(iii) Intensify supervision of primary medical facilities in high transmission risk areas, supplying RDT kits and educating on its use to intensify screening febrile or malaria suspected patients.

- Introducing Expertise in Extermination Personnel

  - Activities include prioritized implementation of the so-called 'Innovative Field Vector Mosquito Extermination Project' in transmission risk areas and planning mosquito extermination projects according to local needs.

- Providing Financial Support to Complement Malaria Control Activities in high transmission Risk Areas

  - Activities include disbursement of 220 million won for malaria control in 22 priority malaria cities and counties as shown below (subsidies in thousand Korean won).

Regional District	Local District	Subsidies
Incheon Metropolitan Area	Ganghwa County	15,000
	Ongjin County	10,000
	Central District	8,000
	West District	10,000
	East District	10,000
	Subtotal	53,000
Gyonggi Province	Paju City	17,000
	Gimpo City	18,000
	Yeoncheon County	18,000
	Goyang City Deogyang District	7,000
	Yangju City	9,000
	Dongducheon City	9,000
	Goyang City Ilsan East District	6,000
	Goyang City Ilsan West District	6,000
	Uijeongbu City	5,000
	Pocheon City	5,000
	Gapyeong County	5,000
	Subtotal	105,000
Gangwon Province	Cheorwon County	17,000
	Goseong County	10,000
	Hwachun County	10,000

Continued…

	Chuncheon City	5,000
	Inje County	5,000
	Yanggu County	5,000
	Subtotal	52,000
Quarantine stations along the DMZ	Gimpo Branch of Incheon National Airport Qurantine Station	5,000
	Gogeong Branch of Donghae Quarantine Station	5,000
	Subtotal	10,000
Total		220,000

- Strengthening Analysis and Distribution of Information in Malaria Transmission Risk Areas

  - Strengthening operation of malaria surveillance and monitoring in transmission risk areas leading to rapid production of epidemiological data of the patient, such as age, sex, occupation, and analytic results. Operation is expected to lead to strengthening of malaria surveillance and collaboration in the field of control through rapid report and statistics distribution.

    Other activities include conducting inspection on current promotional and educational details targeting residents and soldiers.

- Fortifying Prevention at Gaesung Industrial Complex and Geumgang Mountain Tourist Zone

  - Activities to achieve this goal include sustaining collaboration with relevant agencies to prevent and control communicable diseases within the Gaesung Industrial Complex through field inspection, review of specific roles of relevant agencies, research on various mosquito species, providing technological support on extermination methods, diagnosis and furnishing malaria control commodities. Educating residents and employees working at the complex also falls into these activities.

    Education targeting tourists and working with quarantine stations, Public Health Centers and Hyundai Co. are activities to prevent malaria in tourists travelling to Mt. Geumgang.

- Promoting malaria control activities in North Korea

  - Activities include: delivering a package 1.2 million dollars in value, including 200,000 doses of Chloroquine, 50,000 doses of Primaquine, insecticide (5 tons of Permethrin and 10 tons of Deltamethrin), 100,000 ITNs, reagents, etc; and continued participation at the ‘South-North Korea Technical Consultation Meeting on Malaria in the North’ in 2010.

Annex

Table 1. Reported Malaria Cases According to Area* and Occupation in 2008~2009

	Total		Civilians		Reserves		Active duty Soldiers	
	2008	2009	2008	2009	2008	2009	2008	2009
Seoul	123	169	80	115	39	47	4	7
Busan	24	30	6	2	17	26	1	2
Daegu	15	24	1	4	13	19	1	1
Incheon	**162**	**162**	**141**	**125**	**9**	**22**	**12**	**15**
Gwangju	8	10	0	1	8	9	0	0
Daejeon	10	19	5	2	5	14	0	3
Ulsan	6	15	0	0	6	15	0	0
Gyonggi	**480**	**605**	**277**	**321**	**57**	**66**	**146**	**218**
Gangwon	**109**	**153**	**38**	**35**	**9**	**9**	**62**	**109**
Chungbuk	7	18	0	9	7	8	0	1
Chungnam	19	27	6	10	10	15	3	2
Jeonbuk	14	18	3	4	8	12	3	2
Jeonnam	11	11	6	2	4	7	1	2
Gyeongbuk	16	30	0	3	13	25	3	2
Gyeonnam	16	25	3	3	13	22	0	0
Jeju	3	1	0	1	3	0	0	0
Total	**1,023**	**1,317**	**566**	**637**	**221**	**316**	**236**	**364**

**** Note**: "Area" refers to the largest administrative zone in the Republic of Korea. There are 16 such zones, including 7 Metropolitan areas and 9 provinces.*

Table 2. Malaria Incidence in Transmission Risk Areas from 2005 to 2009

Regional District	Local District	Malaria incidence per 100,000 population				
		'05	'06	'07	'08	'09
Gangwon	Cheorwon County	44.6	53.6	46.1	50.4	65.0
	Yanggu County	0.0	4.7	14.1	0.0	0.0
	Hwachun County	8.3	8.5	8.6	4.3	4.1
	Goseong County	0.0	22.1	6.5	3.3	9.9
	Chuncheon City	1.2	2.3	2.7	2.3	0.0
	Inje County	3.1	3.1	0.0	0.0	3.2
Gyonggi	Yeoncheon County	75.1	88.0	87.3	57.1	44.1
	Paju City	54.7	68.5	51.6	27.3	24.6
	Gimpo City	29.8	49.6	49.3	13.6	18.8
	Goyang City Ilsan East District	18.6	13.3	12.9	5.4	7.6
	Goyang City Ilsan West District	-	15.9	11.7	4.5	9.7
	Goyang City Deogyang District	8.3	8.3	11.6	7.1	6.4
	Dongducheon City	11.1	13.1	9.2	8.9	14.1
	Yangju City	5.7	9.1	8.0	5.6	5.0
	Pocheon City	2.0	3.2	4.4	3.1	7.5
	Uijeongbu City	2.2	3.9	3.6	1.6	3.2
	Gapyeong County	3.6	3.6	3.6	3.5	0.0
Incheon	Ganghwa County	168.6	299.5	319.8	106.1	68.4
	Ongjin County	39.4	43.6	29.9	46.6	39.3
	Central District	11.0	27.1	26.4	6.7	4.5
	West District	5.1	16.5	19.4	6.1	6.6
	East District	6.3	13.0	14.7	5.4	6.6

Local Definition of Malaria Incidence:

$$\frac{\text{Total Malaria Case in a given year}}{\text{Population registered after census in given year}} \times 100{,}000$$

Table 3. Malaria Case Load, Democratic People's Republic of Korea (2005~2008)

Year / Province	2005	2006	2007	2008	2009
Pyongyang	135	105	253	533	307
South Pyongan	781	1,703	1,500	3,386	2,706
North Pyongan	747	1,439	1,803	3,458	3,235
Chagang	25	18	73	193	116
South Hwanghae	1,906	2,303	814	5,120	4,123
North Hwanghae	5,844	1,498	1,453	5,493	4,069
Kangwon	1,244	1,925	1,143	3,720	3,557
South Hamgyoung	574	267	273	1,101	469
North Hamgyoung	248	88	119	338	87
Ryangang	3	7	5	67	10
Total	11,507	9,353	7,436	23,409	18,679

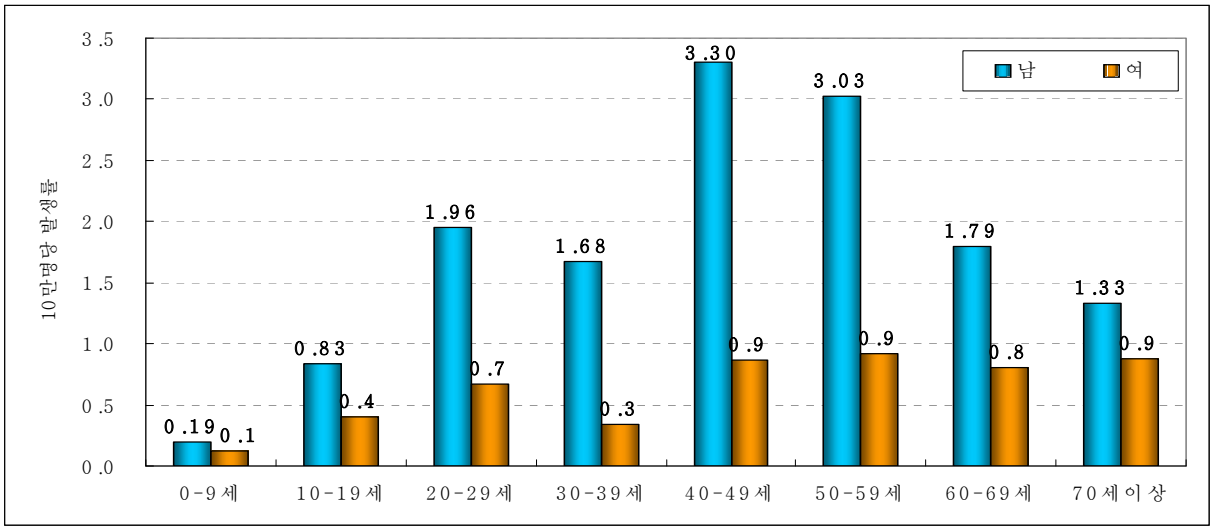


Figure 1. Reported Malaria Incidence by age and gender in civilians in 2009 (excluding imported cases)

※ The data for 2009 is provisional and subject to change
※ Y-axis: patient incidence per 100,000
※ X-axis: Indicates age group (0-9 years, etc.)
※ Blue: Males; Orange: Females

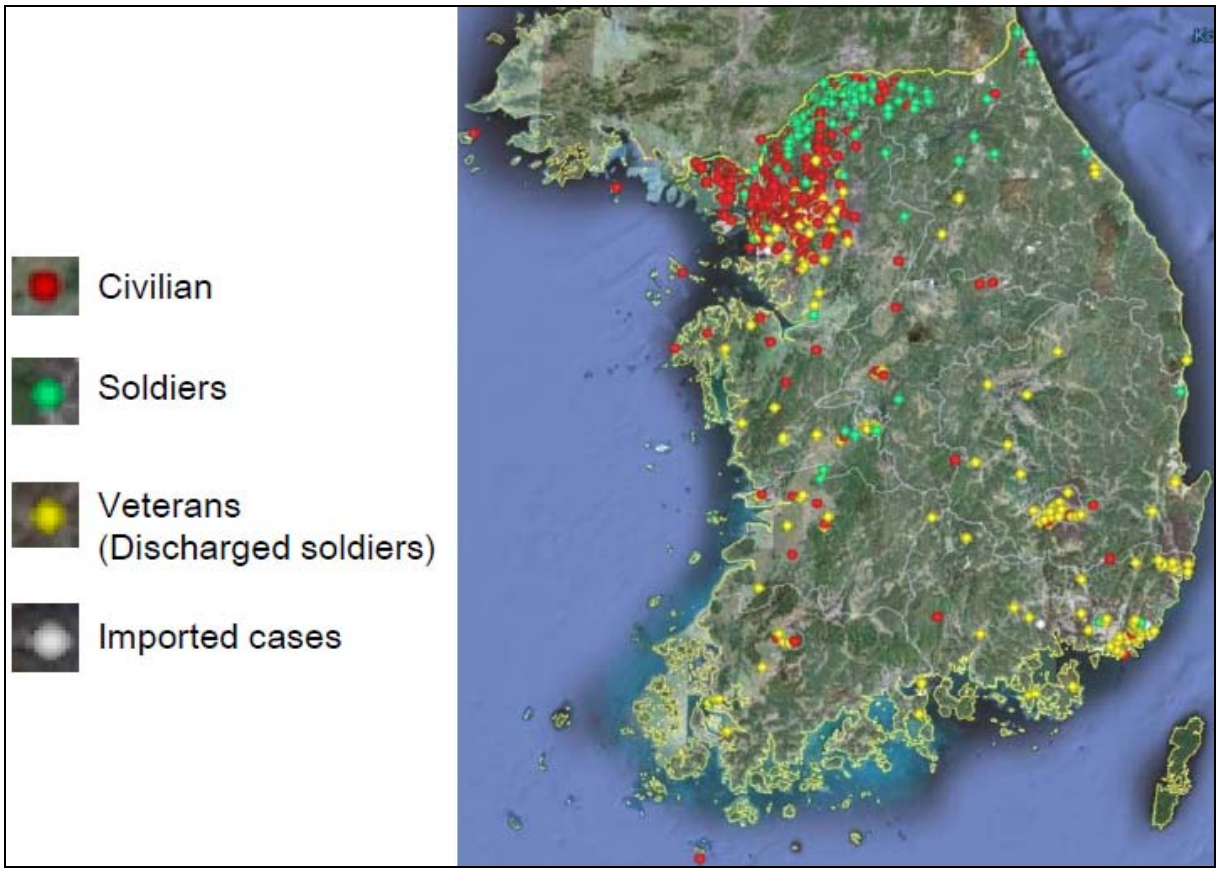


Figure 2. Malaria transmission in the Republic of Korea, January – October, 2009.

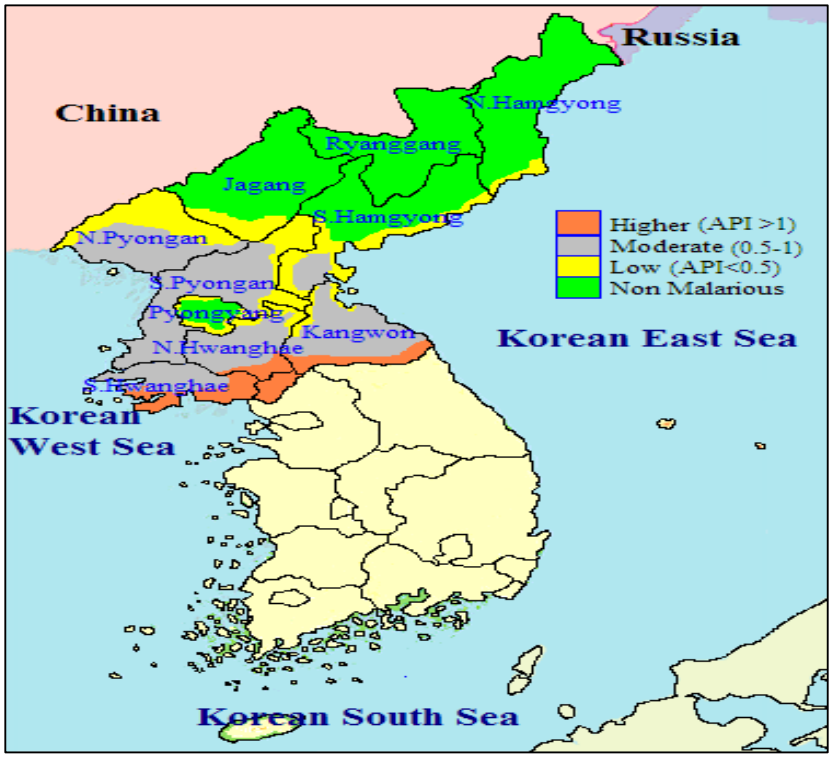


Figure 3. Stratification of malaria burden in the Democratic People's Republic of Korea.