National Multi-Year Plan
For Immunization in 2011-2015

Ministry of Health
The Government of the Republic of Kiribati
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List of Acronyms

AD: Auto-Disable
AFR: Acute Fever and Rash
AFI: Acute Flaccid Paralysis
CRS: Congenital Rubella Syndrome
EPI: Expanded Programme on Immunization
EU: Europe Union
GAVI: Global Alliance for Vaccines and Immunization
GIN: Gross national Income
HBsAg: Hepatitis B surface antigen
HepB: Hepatitis B vaccine
Hib: Haemophilus influenzae type B
HIS: Health Information Systems
ICC: Inter-agency coordinating committee
JRF: WHO-UNICEF joint reporting form
MHMS: Ministry of Health and Medical Sciences
MR: Measles and Rubella vaccine
NPOs: National Nursing Officers
NRH: National Referral Hospital
PHC: Primary Health Care
SIA: Supplementary Immunization Activity

Executive Summary

The Republic of Kiribati is an isolated central-western pacific island country with a population of 92,533 (2005 census) and a population growth rate of 1.8%. Inhabitants are scattered on 23 islands that are spread over a vast ocean area of 3.5 million square kilometres. The target population is 3,194 (2010 JRF Report) and infant mortality estimated at 38 per 1,000 live births in 2008 (WHO Global Health Statistics, 2010). It is a lower-middle income country with a GNI per capita of $ 1890 in 2009 World Bank, 2010). Strong cultural norms provide the foundations for their way of life.

The unique geographical and cultural characteristics of Kiribati and its less developed social and economic conditions provide particular challenges to improving the health status of its population.

A key objective in the Ministry of Health's National Health Strategic Plan 2008-2011 is to improve child survival. The implementation of a 5 year immunization plan, through a strengthened primary health care service, is one of the priority actions under the child survival objective. Improving child survival will remain a key priority in the National Health Strategic Plan 2012-2015 currently under draft.

The multiyear immunization 2011-2015 plan focuses on nine strategies:

1) Increase and maintain routine immunization coverage to 95% by 2015
2) Improve EPI management capacity and further strengthen health system delivery
3) Bolster and maintain well-functioning cold chain system and delivery of safe and secure immunization services,
4) Strengthen surveillance on EPI target diseases, including strengthening of AEFI surveillance
5) Maintain polio-free status and sustain achievement after global polio eradication
6) Achieve and sustain measles elimination beyond 2012, and accelerate control of rubella and prevention of CRS through integrated vaccination activities and surveillance
7) Reduce chronic carrier rates of hepatitis B to <2% measured among children under 5 years and accelerate hepatitis B control in general population
8) Decrease disease burden of invasive Hib disease through effective introduction of Hib vaccine
9) Introduce other new vaccines such as pneumoccocal, rotavirus and HPV vaccines.

The immunization plan has been costed and the actual and potential sources of funding identified. The total programme cost for the 2010 immunization programme (current EPI vaccines (BCG, MR, OPV, co-financed pentavalent vaccine, TT and DTP booster) is estimated at $389,638. This represents $2.9 per capita and $100.6 per fully immunized child. 74.1% of the program is nationally funded.

The cost of the multi-year plan over the course of 2011-2015 is estimated to be approximately $4.92 million and is discussed in detail in Section 4 of this document. It is

anticipated that overall program costs are expected to increase by 45% between 2011 and 2015. Much of programme increase is due to costs to strengthen health systems, re-establish strong cold chain and introduction of new vaccines: HPV in 2012, PCV in 2012 and rotavirus in 2015. The supply costs alone for routine vaccines and injection supplies are anticipated to rise from USD $43,585 to $308,876 in 2015.

The co-financing contribution for PCV13 for the Government is estimated at $4,805 in 2012, increasing to $29,572 in 2015 until the full cost of $36,965will be borne in 2016.

The Government of Kiribati, AusAID through UNICEF, WHO, JICA and the Europe Union (EU)are the main partners supporting the immunization programme. All have representatives on the Inter Agency Coordinating Committee (ICC).

1. BACKGROUND

The Republic of Kiribati (pronounced as Kiribas) consists of 32 atolls and 1 raised coral island spread over vast areas of central-western Pacific ocean covering over 3.5 million square kilometres, but with a total land area of only 811 square kilometres.. The people of Kiribati are Micronesian in origin. They have strong cultural values and traditions that provide the foundations for their unique way of life.

The remote inaccessible population and poor economic development pose challenges to improving the health status of the people in Kiribati.

1.1 Geographic feature

Kiribati is made up of three island groups: the Gilbert Island, Phoenix Islands and the Line Islands. Ninety-percent (90%)of the population lives in the Gilbert Island Group. South Tarawa, located in the Gilbert Island group, has the main 'urban settlements'. The remaining islands are commonly known as the Outer Islands. A map of Kiribati is attached at Annex 1.

1.2 Demographic profile

According to World Bank figures, the estimated population in 2009 was 98,045. The average population density is 127 per square per kilometre but it increases to 2,558 per kilometer in urban areas of South Tarawa where almost 44% of the population lives.

The latest national census was in 2005. It reported a total population was 92,533 and annual population growth of 1.8%. The 2005 census estimated the under-one-year-old population as 2,462, a crude birth rate of 26.6% and an estimated infant mortality rate of 52 per 1,000 live births (2003). More recent data through WHO estimates an infant mortality rate of 48 per 1000 live births for 2010 (WHS 2010). Furthermore, a door-to-door census was conducted by community nurses and the birth cohort was determined to be 3,194 in 2010.

1.3 History, economic situation and administration

Colonized by the British, Kiribati became a fully independent republic in 1979. It is currently categorized as a lower-middle income by World bank based on its estimated GNI per capita of $1890 in 2009 (World Bank 2010) but as a least developed country by UN system because of its low per capita gross domestic product, limited human resources and high vulnerability to external forces. While the Kiribati economy is vulnerable to changes in financial markets and economic uncertainties, it is relatively resilient because of: prudent management of government reserve funds derived from phosphorous deposit and a domestic income from fishing licences.

Island Councils are responsible for Outer Island administration although most authority stays with the central ministries. The Gilbert Islands group has five administrative districts, the Central, Northern, South Western, South Eastern and North Tarawa. For

administrative purposes South Tarawa is divided into two Island Councils, Betio and South Tarawa.

1.4Health Services

The Ministry of Health and Medical Sciences (MHMS)in Kiribati have four departments, hospital and curative services, public health services, nursing services and administration (see annex 2 for the Ministry of Health and Medical Sciences Organization chart**)**.

The main referral hospital, the Tungaru National Hospital, is in South Tarawa. It provides primary and secondary internal medicine, paediatric, maternity, surgical and essential support services. The only other hospital providing surgical services is in Kiritimati Island. It provides emergency surgical and other essential hospital services to the people in the Line Islands. The village of Betio in South Tarawa has a small hospital that provides primary medical, maternity and nursing care. A new hospital is under construction in South Eastern district of the Gilbert Islands.

Primary health care services are delivered through a network of 24 health centres with 1 to 9 satellite dispensaries attached to each health center depending on geographic access and other factors. There are 74 dispensaries in total. Health centres are headed by medical assistant who are trained nurses with additional training in public health and midwifery.

Health centres and dispensaries are staffed by nurses and nurse aids under the supervision of the medical assistant. Nurse aides are appointed by Island Councils. The nurse aids maintain an important link between the MHMS staff and the community. All health centres and some dispensaries that cover a large area, have motor cycles for outreach activities. The Island Councils are responsible for the maintenance and repair of motor cycles.

Primary health care services are supervised and supported by six Principal Nursing Officers (PNOs) based in the central MHMS although in recent years there has been little supervision. Each PNO is responsible for coordinating all the health services in a district and a specific national public health programmes. For instance, the PNO who coordinates the immunisation programme is also responsible for the supervision of all medical and health services in CentralTungaru District. The PNOs report to the Director of Nursing and the Director of Public Health.

1.5 Health strategic planning

National Health Strategic Plan (2008-2011) of MHMS provides the vision and strategic direction for operational planning of MHMS. Increasing child survival is a key priority action of one of six strategic objectives outlined in this strategic plan. Achieving and maintaining high immunization and implementing the Immunization Multi Year Plan within set timelines are priority activities planned under the child survival sub objective.

2. THE EXPANDED PROGRAMME ON IMMUNISATION IN KIRIBATI

The Expanded Programme on Immunisation (EPI) was introduced in Kiribati in the early 1980s to protect children against diphtheria, measles, pertussis, poliomyelitis, tetanus and tuberculosis, and its women against maternal tetanus. Immunisation of infants against hepatitis B was added in the early 1990s and conjugate Hib vaccine was introduced in August 2008.Kiribati was declared polio free in 2000. Following nationwide wide-age group measles campaigns in 1997, 2001 and 2006, almost no measles cases have been reported in recent years. Table 1 shows the current immunization schedule in Kiribati.

Table 1: Kiribati current immunization schedule, 2010

Vaccine *(do not use trade name)*	**Ages of administration** *(by routine immunization services)*	**Comments**
BCG	Birth	
Hepatitis B	Birth (within 24 hours),	Uses monovalent hepatitis B vaccine
DTP-HepB-Hib	6 weeks, 10 weeks, 14 weeks	Fully liquid single dose vial, introduced from August 2008.
OPV	6 weeks, 10 weeks, 14 weeks	
MR	12 months, 6 years	MR replaced monovalent measles vaccine in 2004. 2nd dose of MR has been integrated into routine immunization program since 2007.
DPT booster – children	6 years	Given along with MR vaccine through schools.
TT	10 years, 13 years	Given only to girls through schools till 2010, but planned to be extended to boys as well from 2011.
TT – pregnant women	Two doses one month apart in each pregnancy	

2.1 Delivery of Immunization Services

Immunization services along with other primary health care services are delivered by health centres and dispensaries either through special immunization sessions organized at health facilities on specific days or "on demand" any day of the week in the health facilities. "On demand" immunization is limited to health facilities with functioning refrigerators. It is estimated that 40% of all children immunized are vaccinated "on demand" in health facilities but in general "demand' is low. Opportunistic vaccination prompted by nursing staff is limited.

Special immunization sessions are organized 3 to 4 days each month. These sessions are organized flexibly at health centre level. Each health centre and dispensary schedules its

own sessions schedule depending on the availability of vaccines. Because there are no fixed dates for immunization communities often do not receive any advanced notice of immunizations schedule dates. The EPI coordinator estimates that only about 60% of the vaccinated children receive vaccinations through an outreach session. Scheduled immunization services are missing a significant percentage of eligible children and many mothers are either unwilling or unable to have their children vaccinated in health facilities or have insufficient knowledge of the alternative immunization delivery mechanisms.

2.2 Overall coverage

Table 2 outlines the reported coverage based on annual WHO-UNICEF Joint Reporting Forms (JRFs) in 2006-2010. The significant jump in the number of surviving infants in 2010 as compared to previous years is due to the consensus reached after a door-to-door census was conducted by community nurses.

Table 2 Coverage of EPI vaccines by year, 2006-2010, Kiribati

Year	2006	2007	2008	2009	2010
Estimated Target	2506	2551	2600	2665	3194
Surviving infants	2506	2551	2600	2527	3194
BCG	114.6	90.0	82.6	76.0	87
HepB1<24h	68.3	58.2	58.7	52.0	63
DTP1	98.9	98.6	97.0	99.0	90
DTP3	86.9	93.9	81.8	86.0	91
OPV3	87.0	92.6	74.1	84.2	95
HepB3	88.7	95.5	83.3	86.0	91
Measles Rubella1	61.0	93.0	73.0	81.5	89
Measles Rubella 2					20
Hib3**	NA	NA	41.0	86.0	91

* JRF, Joint Reporting form on immunization, officially submitted by the country to WHO and UNICEF.
**introduced in August 2008 as pentavalent vaccine (DPT-HepB-Hib).

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Some problems are experienced with EPI data recording and reporting. While immunisation coverage is analysed nationally, lack of consensus among partners on the denominator to be used has resulted in considerable variation of coverage. Other incongruities occur in reporting, for instance, the coverage of BCG was over 100% for a couple of years and numbers of children reported to have been vaccinated greater than the size of estimated birth cohorts.

Dropout rates suggest defaulter tracking needs more attention. In 2006 the reported drop out rate from DPT1 to DPT3 was 12.2%, higher than globally accepted level of 5%. Furthermore, while the dropout rate from BCG given at birth to Measles-Rubella given at 1 year of age was reported as 46.8%, it improved substantially in 2009 with MR1 coverage rate higher than BCG coverage rate. By 2010, drop out rates had reduced to -1.

Following implementation of training in 2010, immunization monitoring charts were introduced in 2011 at all health facilities.

2.3 Accelerated Disease Control

2.3.1 Maintaining polio-free

The Western Pacific region was certified polio-free in 2000. Since that time, Kiribati has reported no endemic or imported cases of polio and has sustained polio-free status. Nevertheless, it must continue its vigilance in meeting high-quality achievement of surveillance for acute-flaccid paralysis (AFP) and maintaining coverage of ≥90% of OPV3. As with many other Pacific Island countries, surveillance and immunization coverage performance have slipped in the past few years as complacency sets in, so control efforts much be reinforced.

2.3.2Measles Elimination and Rubella Control

Supplementary immunisation campaigns against measles were carried out between 1997 and 1998 targeting children between 9 months-15 years. The measles campaign was repeated in 2001 targeting children between 1 and 5 years. The routine dose of measles vaccine for children was replaced by measles-rubella (MR) vaccine in 2004 with support from UNICEF. A supplementary MR immunisation campaign was conducted in 2006 targeting all children from 1to 15 years and girl up to 19 years. Introduction of a routine second dose of MR vaccine at school entry in primary school (6 years) in 2007 following a SIA with MR vaccine targeting girls up to 19 years as of 2006 has built a good basis for the country to accelerate control of rubella and prevention of CRS in the country.

Supplementary Immunization Activities using MR vaccine were again conducted nationwide in 2009 targeting children aged 12-59 months to address gaps in achieving high coverage through routine vaccination services. No measles cases have been reported in Kiribati from almost 2005.

However, the routine coverage of MCV has been low for many years, which still makes the country susceptible to measles outbreaks once measles virus importation occurs. The introduction of MR vaccine in 2004 makes if even more important to increase the routine coverage of MR vaccination so that the country does not face the increased risk of congenital rubella syndrome (CRS) in the babies of young women who missed out on immunization and did not get any natural immunity in infancy in the future.

Measles elimination requires sensitive surveillance of acute fever and rash (AFR) cases. Active hospital-based surveillance on AFR is underway in Kiribati, though no reports of AFR cases in recent years suggest a weakness in the surveillance system. Hence, improvement is required to ensure timely case detection and quality of case investigation.

2.3.3Hepatitis B

Kiribati had very high rates of chronic hepatitis B infection in the late 1990s. A study in 1998 showed that 27.4% of students aged 10-13 years (who were born before the

introduction of hepatitis B vaccination) and 15.1% of women at antenatal clinics were positive for hepatitis B surface antigen (HBsAg). A later study of pre-school children who had the opportunity to be vaccinated reported carrier rates of 3.8%.

In 2006 at risk health worker's and young men entering the marine Training School were tested and offered immunization against hepatitis. Vaccination is offered to all the new health workers on regular basis. The coverage of birth dose of hepatitis B vaccine had never been reported to be greater than 70% and has declined from 68% in 2006 to 52% in 2009. Furthermore, it is possible that these coverage rates may be overestimated because of double reporting has been reported. The current coverage level will not be sufficient for the country to achieve the regional goal of reducing chronic infection rate to < 2% among children aged 5 years old by 2012.

It is estimated that that 85% of births take place in health facilities nationwide - with over half of all births occurring at Tungaru Central Hospital alone. With this, systems and management to ensure the birth dose of hepatitis B is given within 24 hours after birth should be feasible and are essential to ensure opportunities to immunize babies are not missed.

The timeliness of birth dose of Hepatitis B vaccine has been monitored and reported since 2005. The reported coverage was 68% in 2006 but declined to 52% in 2009 and increased further to 63% in 2010. The reported coverage of MR1 vaccine was 61% in 2006 but increased substantially to almost 81.5% in 2009 and increased even further to 89% in 2010.

2.4. New Vaccine Introduction

2.4.1 Eliminate invasive Hib disease

Haemophilus influenzae type B (Hib) is recognised as a public health problem in Kiribati. Kiribati introduced DTP-Hep-Hibin August 2008. Kiribati achieved 86% coverage with three doses of pentavalent vaccine in 2009 and 91% in 2010.

Hib meningitis rate among children under 5 years of 66 per 100,000 and estimated 16-48 cases and 2-5 deaths per year (ref WHO). The same study estimated the cost of introducing Hib vaccine at about US $350-$1,100 per case prevented and $3,400-$9,100 per death prevented. This indicates a highly cost-effective intervention.

The vaccine introduction has been smooth and the vaccine well-accepted by communities, with coverage achieving 91% in 2010. The opportunity has been used to strengthen cold chain and logistics and further develop vaccine and data management skills and capacity of staff.

2.4.2 Pneumococcal conjugate vaccine (PCV-13)

There is no specific pneumococcus disease surveillance or special disease burden studies undertaken in Kiribati. However, as per WHO estimates published in 2009, 239 (183-308) cases of severe illness and 7 deaths (5-8) occur each year in Kiribati from invasive pneumococcal disease. Majority of these cases are from pneumonia [216, (166-282)] and meningitis [3(2-3)]. In addition, pneumococcal infection are also estimated to cause about 18 cases on other pneumococcal diseases such as otitis media, septecemia, etc. There is also no specific data on the prevalent serotypes of pneumococcal infection in Kiribati. However, assuming the similar serotype distribution as in other oceanic countries, it may be assumed that the 13-valent vaccine may provide about 70% protection against the invasive disease, and hence may prevent 166 cases of severe illness and 5 deaths out of an estimated 239 cases and 7 deaths, respectively.

The cause of mortality data for under-1 deaths in 2010 suggest almost 15% of all deaths due to pneumonia, while 5% of under-1 deaths due to meningitis. This suggests that introduction of pneumococcal vaccine may substantially reduce childhood morbidity and mortality.

The introduction of pneumococcal vaccines was already given high importance by the Ministry of Health in its 2008-2011 multi-year plan. Of the two types of pneumococcal conjugate vaccines available through GAVI -- 10-valent (PCV-10) and 13-valent (PCV-13) – the best option for Kiribati is the PCV13. The PCV1-13, targeted for introduction in 2013, has wider serotype coverage and its presentation of 1-dose vials is most suitable for the Kiribati geography.

2.4.3Human Papillomavirus (HPV)

Cervical cancer is estimated to be the most common cancer among women in Kiribati, though exact estimates of incidence and mortality are not available. Kiribati has a screening program based on PAP smear although the coverage remains low, due to lack of treatment facilities. The palliative treatment of the women diagnosed with cervical cancer, most of who are diagnosed at very late stage, is very expensive. Hence, control of cervical cancer through vaccination is considered as most appropriate strategy, though efforts will be continued for improving the screening and the treatment program.

As the market price of HPV vaccines still remains high, and the MHMS of Kiribati approached Australian Cervical Cancer Foundation (ACCF) for support. MHMS along with Australian Cervical Cancer Foundation (ACCF) applied to The GARDASIL® Access Program to receive donations of HPV vaccines [GARDASIL [Human Papillomavirus Quadrivalent (Types 6, 11, 16, 18) Vaccine] to vaccinate 2700 girls 10-12 years of age in 2011. The GARDASIL® Access Program is being managed Axios Healthcare Development (AHD), a US non-profit organization, while the vaccines are made available by a pledge from Merck & Co., Inc. (Whitehouse Station, New Jersey, USA). AHD approved the support for 9600 doses of quadravalent HPV vaccine in May 2010. The vaccinated 10-12 years of girls in the next school year in 2011 from February

to August though their school vaccination program which also delivers MR and DPT vaccine at 6 yrs of age (primary school entry) and TT at 13 years of age.

MHMS has not yet discussed the continuation of the program beyond 2011, but intends to continue to talk to potential donors in the Region for continuation of the support. Hence, continuation of HPV vaccination has been included in the 2011-2015 cMYP.

UNICEF is yet to procure HPV vaccines for developing countries and hence the exact price is not yet known. However, based on procurement by PAHO Revolving Fund and some other countries (e.g. Malaysia), the price is estimated to be approximately USD $18-20 per dose in the near term. The number of 10 year old girls is estimated to be about 1000. This implies that Kiribati has to mobilize about $60,000 to $75,000 per year just for the vaccine costs, which is almost 150% to 200% of their *total* vaccine budget including the full-cost burden of pentavalent vaccine.

2.4.4 Rotavirus vaccine for control of diarrhea

There is no specific rotavirus disease surveillance or special rotavirus disease burden studies undertaken in Kiribati. These studies are difficult to accomplish in Kiribati due to very limited lab capacity in Kiribati. However, WHO estimated that, during 2004, between13 and16child deaths due to rotavirus infection occurred in Kiribati (working estimate of15) (estimates published in 2006).These deaths constitute approximately 26% of the child diarrhoea deaths and 9.3% of the estimated 162 total child deaths for 2004 and yield a child mortality rate of 127 rotavirus deaths per 100 000 children under five years of age. In addition, the causes of mortality data for under-1 deaths in 2010 suggest almost 15% of all deaths due to diarrhoea. This suggests that introduction of rotavirus vaccine may substantially reduce childhood morbidity and mortality.

To gain a better understanding of the burden of diarrhoea among infants, an initiative to systematically analyse retrospective hospital admission records will be undertaken. Kiribati is interested in the introduction of rotavirus vaccine, targeted for 2015; in preparation, further dialogue among key stakeholders to address financial and programmatic implications will be conducted.

2.5 Cold Chain and Logistics

2.5.1 Vaccine supply chain

Kiribati has two first-level receiving stations-Central Pharmacy at MOH and Hospital at Kirimati Island--for vaccines delivered from the sub-regional vaccine cold store in Nadi, Fiji. The central pharmacy of the Ministry of Health receives, stores, and distributes vaccines to the Gilbert Islands Group, which represents 90% of the country's population. The hospital at Kirimati Island also directly receives vaccines from Fiji and is responsible for distributing vaccines to the Line Islands and Phoenix Island Groups. Vaccines are delivered to health centres by air, sea or road transport on monthly basis

The central pharmacy currently receives EPI vaccines once a year from UNICEF.

Dispensary nurses pick up vaccines from health centres before running a vaccination session. In some situations the health centres distribute the vaccines to dispensaries the day of, or the day before, a planned immunization session (See figure 1)

Figure 1.

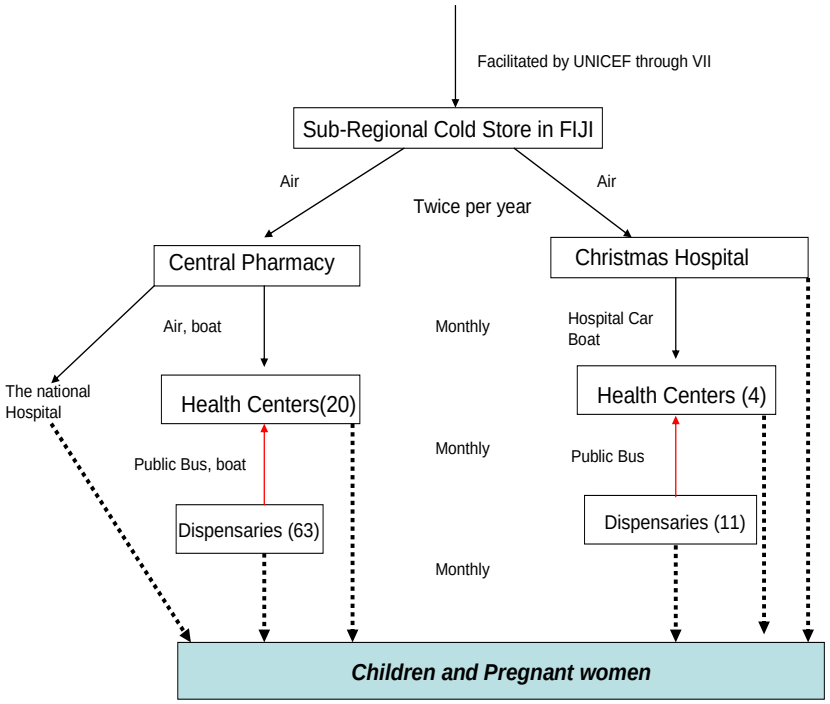


Figure 1 Vaccine distribution flow in Kiribati

2.5.2 Cold Chain System

Because Kiribati faces particularly harsh tropical weather conditions, maintaining the cold chain at the health center level is an ongoing challenge. Subsequently, immunization services on most islands are typically restricted to the day of vaccine delivery and the vaccine wastage rates are high.

The Outer Islands are primarily supported with solar powered units, which have been refurbished in the past five years with support from Japanese Government and UNICEF. During 2006-2007, twenty solar powered units were provided, By the end of 2007 solar refrigerators were functioning in all health centres in the northern, south eastern and south western districts of the Gilbert Islands and in two health centres in both the central district and North Tarawa.

However, a WHO/UNICEF vaccine management assessment (VMA) conducted in October 2010 reported 5 solar units non-functional (Makin, Butaritari, Marakei, Abaiang,

Maiana) with an additional five having sub-standard performance of the the freezer compartment. (Kuria, Aranuka, Abemama, Tab North, Beru). Overall, maintenance and care of equipment was sub-optimal.

As illustrated in the Table below, the VMA found that skills and knowledge of appropriate vaccine management practices were weaker at periphery levels than at Central level. While the VMA performance in certain areas is markedly low (temperature monitoring, stock management, vaccine wastage), the consultant concluded that this was primarily due to a poor system of documentation and record-keeping rather than ineffective service delivery. Nevertheless, findings from the assessment suggest some key capacity-building steps should be instituted over the next planning cycle to strengthen cold chain systems management. These include:

- Increasing understanding and knowledge at all levels of vaccine sensitivity and proper vaccine handling
- Strengthening temperature monitoring tools, practices and record-keeping
- Improving stock management skills and recording
- Updating cold chain inventory and develop equipment maintenance strategy

A small annual birth cohort scattered over a large geographic area invariably results in high levels of wastage for vaccines supplied in multi-dose vials (10- and 20-dose vials) in the Outer Islands. With the introduction of newer vaccines, it will be important to have a better assessment of levels of vaccine wastage in different areas and in different contexts, to identify the best approach to controlling wastage feasibly without compromising coverage levels in hard-to-reach areas.

Vaccine Management Assessment, 2010 (target achievement: >= 80%)

No.	Indicator	Central Pharmacy, South Tarawa	14 Service Facilities %
1	Vaccine Arrival Process	0	NA
2	Vaccine storage temperature	53	48
3	Cold store capacity	83	70
4	Building, cold chain equipment and transport	71	70
5	Maintenance of cold chain equipment and transport	86	70
6	Stock management	49	31
7	Effective vaccine delivery	36	76
8	Correct diluents use for freeze dried vaccines	100	85
9	Effective VVM use	100	88
10	Multi-Dose Vial Policy	100	73

11	Vaccine wastage control	50	16

In consequence of these findings, a cold chain and vaccine management improvement plan has been drafted (2011-2013) and is included as Annex 3.

2.5.3 Cold chain Equipment

In 2011, there are six refrigerators with a total positive storage capacity of 709 litres and two freezers with total capacity of 538 litres at the central pharmacy. The refrigerator/freezer store capacity in the central pharmacy is as follows:

- Five (5), VestfrostMK 304 refrigerators with a vaccine store capacity of 108 litres each. Total 540 liters
- One (1) TCW 1152 refrigerator, received in 2005 with a vaccine storage capacity of 169 litres.
- Two (2) Deep freezers MF 314 with a vaccine store capacity of 264 litres each installed in 2008

The central pharmacy currently receives EPI vaccines once a year from UNICEF.

Six Solar Chills were installed in 2011 to address some of these gaps in equipment needs that have been identified. One of the six Solar Chill vaccine refrigerators was installed in the Health Center of Abaokoro, North Tarawa (on 05 May 2011) with the supervision a UNICEF Cold Chain Consultant. The Central Pharmacy technician was trained on solar chill installation in Abaokoro. He will be in charge for the installation of the five solar chill vaccine refrigerators in five health centers: Abaiang, Maiana, Makin, Beru and Tab North. These will be completed upon fabrication of five additional galvanized stand poles and frames for the solar arrays.

Currently there is one TCW 3000 refrigerator (126.5 litres) and one domestic refrigerator (55 litres positive storage and 36 litres freezer capacity) at the Kirimati Hospital. While the TCW 3000 was installed in 2008, the domestic refrigerator is over 12 years old.

The MOH cold chain inventory will need to be updated to reflect additional equipment acquired in the past five years and identify requirements for replacement needs. Furthermore an effective maintenance strategy will need to be instituted.
There are two first level vaccine stores: the central pharmacy and Kirimati Island Hospital

2.5.4 Analysis of positive volume requirement and cold chain capacity

Wastage of EPI vaccines in multi-dose vial presentation (BCG, measles, OPV) is by necessity high in Kiribati. The scattered population and low number of births in many islands, means that often only a few doses of vaccine are used from a 10-dose vial. The introduction of single dose pentavalent vaccines substantially reduced the wastage of

both DTP and Hep B vaccine. With good management the wastage of the pentavalent vaccine can be reduced to 5%. (Wastage rate was 10% in 2010).

As 50% of births in Kiribati take place in the national hospital in Tarawa, Hep B is procured in both 10-dose and 1-dose vials. Hep B 10-dose vials are used to vaccinate babies born at the national hospital against Hep B without too much wastage. The other 50% of the supply used for babies born outside the national hospital.

As illustrated in Table 3 the net positive storage volume required for one fully immunized child with the current routine schedule is approximately 113 cm3. With the introduction of PCV13, the capacity requirement will increase to 151cm3 (increase of 34%), and further to 174.3 (54.6% increase) if HPV is maintained.

With respect to cold chain capacity, the consultant who conducted the VMA in 2010 concluded that cold chain capacity at service delivery level is more than sufficient for introduction of multiple new vaccines. The national level was adequate for all existing vaccines used in the programme in 2010.

The addition in 2011 of two MK 304s has added 216 liters net storage and increased the total cold chain storage capacity at the central level from 540 liters to 709 liters. As illustrated in Table 4, with the current routine EPI schedule, there is a surplus capacity at the national level of 338 litres. With the introduction of PCV 13 vaccine in 2012 and sustained supply of HPV, it is anticipated that an additional 205 litres will be required, which the current cold chain capacity is quite adequate to accommodate. In preparation for Rotavirus in 2015, this will need to be re-examined, but as estimates show in Table 4, it is projected that there will be no gap in the cold storage required at the central level even with the addition of Rotavirus vaccine (Table 4).

Applying the same methodology to calculate cold chain storage capacity for Kirimati -- where 10% of the population resides -- the refrigerator and freezer storage capacity is 167 litres over the required capacity (Table 5), so the introduction of PCV13, HPV and Rotavirus will not be a constraint.

Further detailed analysis at the district level again re-confirmed that there is significant surplus capacity with the current EPI schedule that will not be compromised with the introduction of multiple new vaccines.

Table 3 Storage volumes required for fully immunizing one child (cm^3)

Vaccine in Immunization schedule, Kiribati

Name of vaccine	Number of doses	Storage volume per dose (cm3)*	Wastage rate	Net (+2 to +8) Storage volume required per child (except for PHC level)	Current schedule (2010)	Current schedule +PCV13	Current schedule+HPV	Current schedule+HPV +PCV-13	Current schedule+HPV +PCV-13+RV	Schedule
BCG	20	1.20	90	12.00	1	1	1	1	1	
DTP	10	3.00	70	10.00	1	1	1	1	1	6 years
HepB	10	4.00	50	8.00	0.5	0.5	0.5	0.5	0.5	birth dose
HepB	1	18.00	5	18.95	0.5	0.5	0.5	0.5	0.5	birth dose
Measles-rubella (MR)	10	2.50	70	8.33	2	2	2	2	2	12 mo, 6 yr
OPV	10	2.00	75		3	3	3	3	3	6wk, 10wk. 14wk
TT	10	3.00	55	6.67	3	3	3	3		13 yr, 2-dose in preg
DTP-HepB+Hib	1	12.86	5	13.54	3	3	3	3	3	6wk, 10wk. 14wk
PCV-13	1	12.00	5	12.63		3		3	3	6wk, 10wk. 14wk
HPV (gardasil)**	1	15.00	5	15.79			1.5	1.5	1.5	0, 2, 6 months for 9-10 yr old girls only
RV (rotarix)	1	17.10	5	18.00					2.0	6wk, 10wk.
Net storage volume per fully immunized child					112.75	150.65	136.44	174.33	190.33	

*Per-dose volumes given here are from the secondary packaging, if vaccines are stored in their tertiary packaging, the per-dose storage volume may be higher

**the cold storage volume of single dose oral squeeze tube in 50-dose secondary packaging

**since only given to girls, the number of doses are counted as 1.5, though each eligible girl will receive 3 doses.; the cold storage volume per dose is based on single dose vial in 10 vials secondary packing

% in cold chain space with addition of pneumo:	33.6%
% in cold chain space with addition of pneumo + HPV:	54.6%

Table 4 Vaccine requirements and cold storage capacity at Central Pharmacy (2011)

Sn	Vaccine	No of dose per vial	Packed volume, including wastage in stores, cm3 +2C to +8C R	Packed volume, including wastage in stores, cm3 -25C to -15C F	Packed volume, including wastage at service delivery, cm3 R @ +5C	Immunization Schedule 2011	Max stock (months)	Target Population Routine EPI 2011	Vaccine Storage Volume (liters)
1	BCG	20	12		19.0	1	12	3269	39
2	MR	10	8		22	2	12	3269	52
3	DTP	10	10		10	1	12	3269	33
4	HepB	1	19.0		19.0	0.5	12	3269	31
5	HepB	10	8.0		8.0	0.5	12	3269	13
6	TT	10	6.7		6.7	3	12	3269	66
7	Penta	1	14		14	3	12	3269	137
8	PCV13	1	13		13	3	12	3269	127
9	HPV	1	16		16	1.5	12	3269	78
10	Rota	1	18		18	2	12	3269	118
Total cold storage capacity requirements for Routine EPI, liters									371
Existing net cold storage capacity, liters									709
Excess cold storage capacity, liters									338

*HPV is noted as 1.5 doses because it is only given to girls. All eligible girls would receive three doses.

Table 5. Vaccine Requirements and Cold Storage for Line & Phoenix Group Islands, Kirimati

Sn	Vaccine	No of dose per vial	Packed volume, including wastage in stores, cm3 +2C to +8C R	Packed volume, including wastage in stores, cm3 -25C to -15C F	Packed volume, including wastage at service delivery, cm3 R @ +5C	Immunization Schedule 2011	Max stock (months)	Target Population Routine EPI 2011	Vaccine Storage Volume (liters)
1	BCG	20	12		19.0	1	6	257	2
2	MR	10	8		22	2	6	257	2
3	DTP	10	10		10	1	6	257	1
4	HepB	1	19.0		19.0	0.5	6	257	1
5	HepB	10	8.0		8.0	0.5	6	257	1
6	TT	10	6.7		6.7	3	6	257	3
7	Penta	1	14		14	3	6	257	5
8	PCV13	1	13		13	3	6	257	5
9	HPV	1	16		16	1.5	6	257	3
10	Rota	1	18		18	2	6	257	5
								Total cold storage capacity requirements for Routine EPI, liters	15
								Existing net cold storage capacity, liters	182
								Excess cold storage capacity, liters	167

2.5.5 Staffing

There is no designated cold chain staff at MHMS. The MHMS contracts the Kiribati Solar Company to maintain solar refrigerators in all health centres and dispensaries. The Company has field staff in the Outer Islands. There is no maintenance of electric refrigerators and it is difficult to have them repaired in the Outer Islands.

One of the key priorities in the short to medium-term will be to engage a dedicated cold chain technician to support the ongoing maintenance and cold chain management system.

2.5.6 Injection Waste Mangement

Single-use disposable syringes were used for routine immunization until 2006. Syringes were procured and distributed as part of routine pharmaceutical supplies. In 2006 auto-disable (AD) syringes and safety boxes were procured and used for the supplementary MR immunization campaign. AD syringes are now procured and used in the routine immunization programme, although the policy needs ongoing reinforcement.

In 2010, Rotary International District 2650 donated a new type of incinerator for disposal of medical waste including EPI waste, and all AD supplies in South Tarawa are incinerated. In the Outer Islands, used injection waste is burned and buried. A safe disposal system and guidelines for used injection waste still need to be clearly established.

2. 6 Reporting of data on immunization services and vaccine preventable diseases

Data recording, reporting and management is recognised as an area that needs additional reinforcement. A recent review of health information from the Outer Islands by the EU Outer Island Health System Strengthening project found that the quality of data collection in the Outer Islands needs strengthening and initiatives are ongoing to increase capacity in data reporting and management at national and sub-national levels. WHO also supports health information strengthening.

Since 2008, efforts have been made to improve the administrative data structure with the appointment and training of 18 Island supervisors. Additionally, there has also been the establishment of a data management position at the MOH. Immunization monitoring charts have been introduced nation-wide.

Public health service delivery data is recorded on a MS1 form by health centre and dispensary staff. MS1 forms are sent to the national health information (HIS) centre in MHMS for collation and analysis on monthly basis.

The MS1 form includes information on the number of vaccines given by dose and on a number of cases diagnosed for selected communicable diseases. The number of children

presenting to health facilities with vaccine preventable diseases is also recorded on the MS1 form. No vaccine preventable diseases have been reported for a number of years.

Data from the HIS is used by the EPI coordinator for calculating national coverage for each vaccine and is reported in the joint reporting form (JRF) to WHO and UNICEF.

No specific EPI coverage survey was done between 2005 to 2008. However, a Demographic and Health survey (DHS) was done in 2009 with assistance from SPC, though the data are still not available with MHMS. It will be useful to conduct an immunization coverage survey as part of DHS every 5 years. So the next survey should be planned in 2014.

Additional activities have been undertaken recently to improve immunization coverage monitoring. Following conducting a of a regional Middle Level managers program in Suva in 2010, immunization monitoring charts have been introduced into the country in 2010.

It is also planned that as part of the strategy to improve data quality, a system of Data Quality Self assessment (DQS) will be introduced in the next plan period with the support of WHO/UNICEF in order to build capacity for data management and to improve data quality.

3. MULTI-YEAR PLAN FOR IMMUNIZATION, 2011-2015

3.1. Goal

To minimize the mortality, morbidity, and disability from vaccine-preventable diseases leading to improved health of children and women.

3.2 Immunization Targets

The immunization coverage targets and wastage coverage targets (2011-2015) are outlined in Tables 6 and 7, respectively. A key goal will be to achieve at least 90% coverage for all routine vaccinations by 2015.

Based on lessons learned from Hib vaccine introduction, it is anticipated that it may take some time to align coverage rates of DTP-Hep-Hib and PCV13, even though they are given at the same age interval.

As evident in Table 7, the adoption of mono-dose vials in the Kiribati context has a dramatic positive effect on being able to control wastage levels.

Table 6. Immunization Coverage Targets

	Baseline	Coverage Targets				
Type of Vaccine	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Routine Immunization	**%**	**%**	**%**	**%**	**%**	**%**
Hep B Monovalent	63%	92%	92%	92%	92%	92%
BCG	84%	92%	92%	93%	94%	95%
DPT						
OPV	95%	92%	93%	93%	94%	95%
DTP Hep B Hib	91%	92%	93%	93%	94%	95%
PCV 13			50%	85%	87%	90%
Measles Rubella	89%	90%	91%	92%	93%	95%
School Entry DPT	88%	90%	90%	90%	90%	90%
TT Adolescent	80%	82%	85%	85%	85%	85%
HPV vaccine	0%	0%	90%	92%	92%	92%
TT Pregnant Women	75%	80%	85%	85%	85%	85%
Rotavirus vaccine	0%	0%	0%	0%	0%	85%

Table 7. Wastage Coverage Targets

	Wastage Targets				
Type of Vaccine	**2011**	**2012**	**2013**	**2014**	**2015**
	%	**%**	**%**	**%**	**%**
Hep B Monovalent	15%	15%	15%	15%	15%
BCG	90%	90%	90%	90%	90%
DPT					
OPV	75%	75%	75%	75%	75%
DTP Hep B Hib	5%	5%	5%	5%	5%
PCV 13		5%	5%	5%	5%
Measles Rubella	70%	70%	70%	70%	70%
School Entry DPT	70%	70%	70%	70%	70%
TT Adolescent	82%	50%	50%	50%	50%
HPV vaccine		5%	5%	5%	5%
TT Pregnant Women	55%	55%	55%	55%	55%
Rotavirus vaccine			0%	0%	15%

3.3. Objectives

i. To increase and sustain routine immunization coverage of at least 90% for all vaccines included in routine schedule;
ii. To improve management capacity on EPI and further strengthenthe health system.
iii. To maintain well-functioning cold chain and logistics systems to ensure quality of vaccines being delivered to all eligible population groups;.
iv. To strengthen surveillance of vaccine preventable diseases including an AEFI surveillance system
v. To maintain polio-free status
vi. To eliminate and sustain measles elimination beyond 2012 and accelerate control of rubella;
vii. To reduce chronic carrier rates of hepatitis Bto less than 2% measured among children at least 5 years old and accelerate hepatitis B control in general population;
viii. To eliminate Hib diseases by maintaining high coverage with Hib containing pentavalent vaccine (>90%);
ix. To introduce pneumococcal conjugate vaccines (with GAVI support) and consider introduction of other new vaccines

3.4. Strategies and activities

3.4.1Improve routine immunization coverage

(1) Strategies

- Implement effective mechanisms for timely identification of new births and development of a good system to track immunization defaulters.
- Improvepredictability and efficiency of immunization sessions and outreach activities;
- Introduce micro planning tools into EPI services in order to better plan immunization activities at health facility level;
- Strengthen coverage monitoring (including use of monitoring charts) and supportive supervision to identify weak areas and address attributive factors in timely and effective manner;
- Increase public awareness and promote active community demand for immunization services.
- To revise child-held immunization card and include all the potential new vaccines to be included in the schedule and the vaccines given in the school and make efforts to increase card retention rates.

(2) Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015

Revise immunization policy and scheduleto include all new vaccines	X				
Continue efforts to improve birth register and set up good tracking system for defaulter	X	X	X	X	X
Revise and print Immunization register book including planned new vaccines for EPI providers	X				
Develop a new child-held immunization card including all the vaccines through 18 years of age	X				
Annual refresher EPI training including microplanning tools	X	X	X	X	X
Monitor coverage through quarterly EPI data analysis	X	X	X	X	X
Supervision visits to health facilities to evaluate performance of EPI providers and identify issues	X	X	X	X	X
Introduce mass media and community awareness campaign	X	X	X	X	X

3.4.2 To improve management capacity and strengthen the health system

(1) Strategies

- Improve data quality and data utilization;
- Improve EPI skills and capacity of national and sub-national staff
- Introduce monitoring, feedback and follow-up process;
- Strengthen partner coordination through Inter-Agency coordination committee(ICC)
- Assess progress toward to GAVI support annually

(2)Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015

Consolidate on quarterly basis Immunization data by district	X	X	X	X	X
Monitor coverage quarterly. Provide feedback to responsible PNOs and health facilities	X	X	X	X	X
Conduct regular ICC meetings to review quarterly reports , coordinate support and oversee implementation of plan	X	X	X	X	X
Conduct mid-level managers and refresher trainings on key components of EPI	X	X	X	X	X
Reinforce use of EPI monitoring charts	X	X	X	X	X
Monitor timeliness and completeness of reporting at all elvels	X	X	X	X	X
Conduct data-quality self-assessment			X		
Support EPI coordinator attending annual workshop	X	X	X	X	X
Support EPI staff/cold chain staff attending annual regional EPI trainings	X	X	X	X	X
Immunization coverage survey as part of DHS			X		

3.4.3 Improve cold chain, logistics and safe disposal of immunization waste

(1) Strategies

i. Maintain and rehabilitate EPI cold chain system, and ensure effective cold chain replacement mechanism in place
ii. Establish system to increase understanding and knowledge at all levels of vaccine sensitivity and proper vaccine handling, including effective stock management and record-keeping
iii. Introduce mechanism for monitoring wastage levels
iv. Ensure adequate supplies of EPI vaccines in all the health facilities that provide EPI services

v. Develop policy and guidelines for safe disposal system of injection waste

(2) Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015
Procure EPI vaccines and injection related commodities	X	X	X	X	X
Develop a system for ongoing maintenance all the cold chain equipment	X	X	X	X	X
Maintain an updatedcold chain inventory and develop a rehabilitation plan	X	X	X	X	X
Conduct updated capacity gap analysis in preparation for new vaccine intro			X		
Procure additional cold chain equipment,vaccine carriers and ice-packsas needed	X	X	X	X	X
Develop cold chain policy and field guidelines		X	X		
Develop and implement training curricula for national and sub-national on vaccine management, including job aids and materials	X	X	X	X	X
Establish and implement system to report and monitor vaccine wastage	X	X	X	X	X
Build capacity in stock management recording and record-keeping	X	X	X	X	X
Introduce temperature monitoring devices and improve record-keeping skills		X	X	X	X
Develop guidelines on safe disposal of injection waste	X				
Fence off burning and waste burial sites (OuterIslands)	X	X	X	X	X
Conduct Effective Vaccine Management assessment			X		

3.4.4Strengthen surveillance on EPI target diseases, including AEFI surveillance

(1) Strategies

- Improve timeliness and completeness of reporting from Hospital Based Active Surveillance System.
- Conduct quality case investigation for any Acute Flaccid Paralysis (AFP) case, Acute Fever and Rash (AFR) or Neonatal tetanus(NT) case and collect specimens as required.
- Improve timeliness and completeness of reporting of VPD through MS-1 form as part of health information system.
- Establish AEFI surveillance system for all vaccines in use

(2) Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015
Monthly Active surveillance for any AFP, AFR and NT	X	X	X	X	X
Case investigation for any AFP, AFR and NT and specimens collection and shipping	X	X	X	X	X
Monthly data reporting of MS-1 form	X	X	X	X	X
Establish a system for reporting AEFIs	X	X			
Develop field guidelines for recognition and response to AEFI		X			
Develop SOPs for investigation of reported AEFI		X			
Include AEFI training in MLM training	X	X	X	X	X

3.4.5Maintain polio-free status

(1) Strategies

- Reach and maintain high coverage (≥90%) of OPV3 as part of strengthening routine Immunization services
- Ensure quality of Acute Flaccid Paralysis surveillance as part of strengthening EPI surveillance and conduct quality case investigation.

(2) Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015
Reinforce routine activities on maintaining polio-free status into strengthening routine immunization services and improving quality of EPI surveillance.	X	X	X	X	X
Add OPV immunization to other planned SIAs if needed, and if the routine coverage declines.	X	X	X	X	X

3.4.6 To eliminate and sustain measles elimination and accelerate rubella control

(1) Strategies

- Reach and maintain high coverage (>95%) of 1st and 2nd dose of MR vaccine through routine immunization program;
- Strengthen surveillance of Acute Fever and Rash (AFR), increase awareness and local capacity in the area of AFR surveillance ;
- Conduct quality MR Supplemental Immunization Activity when and if a gap in Population immunity against measles is identified;

(2) Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015
Raise public awareness dangers and prevention of measles and rubella	X	X	X	X	X
Conduct national training on AFR surveillance (e.g. part of national communicable diseases surveillance training	annually	annually	Annually	annually	annually

Conduct Active Surveillance on AFR and case investigation on monthly basis	X	X	X	X	X
Monitor the accumulation of susceptible children against measles		X	X	X	X
Plan, prepare and implement MR Supplemental Immunization Activity when the total number of accumulated susceptible children approach the size of one birth cohort*		To be decided (12-47 months)			To be decided (12-47 mo.)

*Based on coverage according to JRF, recommend SIA every 3 years – next one in 2012, then again in 2015, each time targeting 12-47 month old children.

3.4.7Reduce disease burden of Hepatitis B through vaccination

(1). Strategies

i. Since 85% of births taking place in facilities, increasing timely birth dose vaccination among facility births will have a significant impact on improving coverage. Depending on what is needed – strategies/activities could include:
   a. Assessment of reasons for low facility-based coverage
   b. Training health care staff
   c. Ensuring facilities have appropriate stocks of vaccine
   d. Reviewing facility policies and guidelines to ensure that administration, recording and reporting of timely birth dose is included and consider adopting standing orders for vaccination if they have not been adopted.

ii. Develop strategies specific to improving Hep B birth dose outside of health facilities

iii. Improve awareness to importance of birth dose hepatitis B and Hepatitis B vaccination

iv. Vaccinate allnew health staff with Hepatitis B vaccine on ongoing basis

v. Develop information for people with hepatitis B and their family on how to keep healthy and prevent the spread of Hep B

(2). Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015
Monitor coverage and timelines of Hep B birth dose and assess gaps	X	X	X	X	X
Review site-specific strategies to improve timeliness and coverage of Hep B birth dose	X	X			
Collaborate with maternal and child health counterparts to assess the role and feasibility of birth attendants providing Hep B vaccine for births occurring at home	X	X			
Assess feasibility of providing a birth dose Hep B vaccine outside cold chain to new-borns who are not delivered at health facility equipped with cold-chain		X	X	X	
Review budget to ensure that it is sufficient to support outreach vaccination of home births.	X	X	X	X	X
Vaccinate health workers on ongoing basis	X	X	X	X	X
Develop and update pamphlet on keeping healthy with and preventing the spread of Hepatitis B	X			X	
Conduct Hepatitis B serosurvey among 6 year old school children			X	X	X

3.4.8 Eliminate invasive Hib disease

(1). Strategies

- Achieve and maintain more than 90% coverage with three dose of pentavalent vaccine before six months of age.
- Increase cofinancing of pentavalent vaccine by MHMS between 2011 and 2015 to transition out of GAVI funding by end of 2015 and to sustain the vaccine beyond 2015.

(2) Activities

Activities	Implementation Year				
	2011	2012	2013	2014	2015
Maintain >90% DTP-Hep-Hibcoverage by 6 months of age	X	X	X	X	X
Prepare and submit annual progress report to GAVI	X	X	X	X	X
Mobilize additional funding from MHMS each year to increase the cofinancing levels	X	X	X	X	X

3.4.9 To introduce pneumococcal conjugate vaccines and consider introduction of other new vaccines

(1). Strategies

i. Introduce pneumococcal conjugate vaccine (PCV-13) with GAVI support in 2012 for all infants.
ii. Sustain school-based vaccination of girls 10-12 years with HPV vaccine
iii. Continue and strengthen the cervical cancer screening program and treatment system
iv. Prepare for introduction of rotavirus vaccine in 2015

2) Activities:

Activity	Implementation Year				
	2011	2012	2013	2014	2015
Systematic assessment of incidence and mortality from pneumonia and meningitis based on retrospective analysis of hospital and laboratory records	X	X	X	X	X

Submit pneumococcal application to GAVI Alliance (PCV13)	X				
Implement key preparatory elements in new vaccine introduction plan (pneumococcal)	X	X			
Monitor implementation of new vaccine introduction(including monitoring of adverse events)		X	X	X	X
Consider post-introduction evaluation (PIE) for pneumococcal vaccine			X		
Continue political advocacy with key decision-makers to secure financing of pneumococcal and newer vaccines	X	X	X	X	X
Continue resource-mobilisation among donors for financing of pneumococcal, HPV and newer vaccines	X	X	X	X	X
Review the coverage of cervical cancer screening program and its effectiveness using checklist developed by WPRO/WHO		X			
Sustain HPV vaccine in schedule if feasible		X	X	X	X
Continue public awareness campaign for cervical cancer and HPV vaccine	X	X	X	X	X
Systematic assessment of incidence and mortality from diarrhoea based on retrospective analysis of hospital records		X	X	X	X
Assess programmatic and financial implications of introducing rotavirus vaccine through technical working groups and partner coordination mechanism			X		
Begin preparatory phase for rotavirus vaccine and address pertinent gaps				X	
Introduce Rotavirus vaccine					X

4. COSTING AND FINANCING OF IMMUNIZATION PROGRAM: 2011-2015

The costing of the multi-year plan for immunization, 2011-2015, includes the cost of vaccines, injection equipment and supplies, cold chain and transportation equipment, operational costs and supplemental immunization activities.

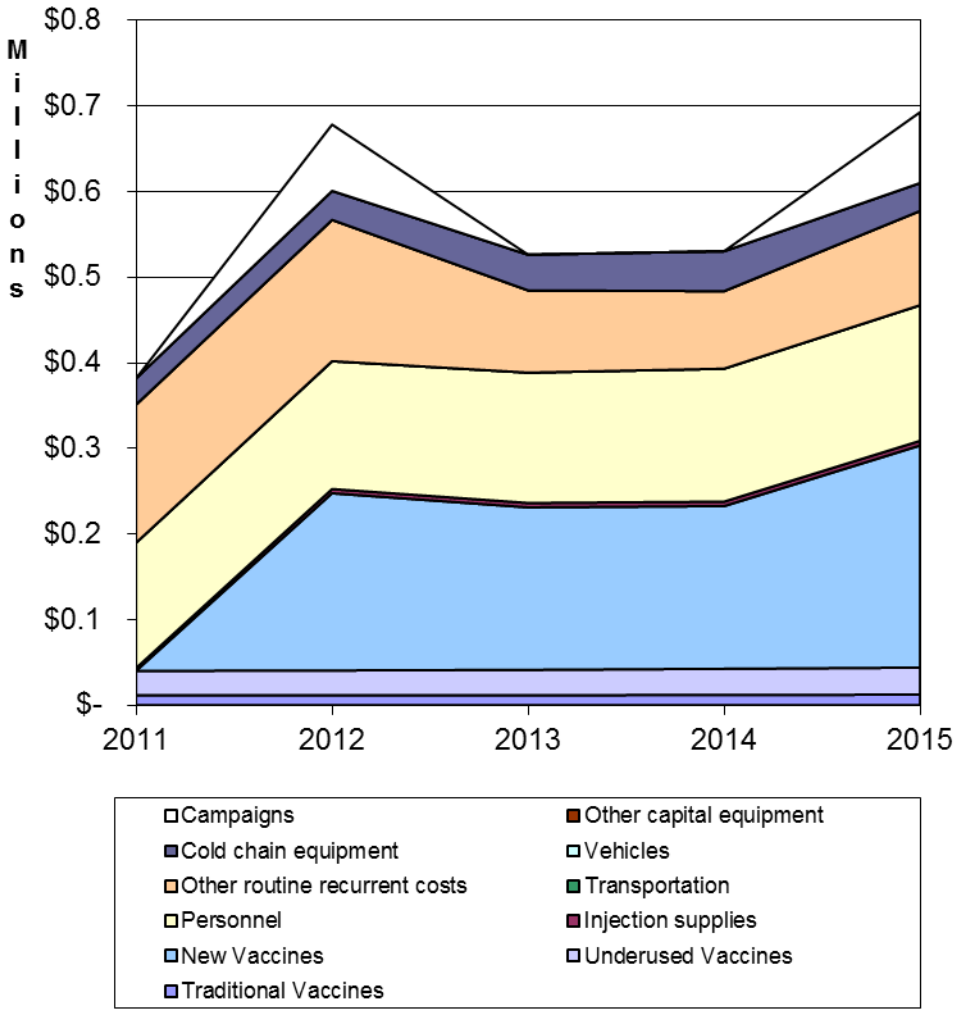
4.1 Vaccines for routine EPI programme

The total cost for EPI vaccines (BCG, MR, OPV and pentavalent vaccine) for children under 1 years of age and tetanus immunization (TT) for children at school entry, girls when leaving school and pregnant women for the current immunization schedule is estimated at $389,638. This represents $2.9 per capita and $100.6 per fully immunized child. 74.1% of the program is nationally funded.

Baseline Indicators	2010
Total Immunization Expenditures	$389,638
Campaigns	$100,000
Routine Immunization only	$289,638
per capita	$2.9
per DTP3 child	$100.6
% Vaccines and supplies	14.3%
% Government funding	74.1%
% Total health expenditures	1.8%
% Gov. health expenditures	2.1%
% GDP	0.15%
Total Shared Costs	
% Shared health systems cost	
TOTAL	$389,638

The total costs of the vaccine program are described in the following figure. What this figure demonstrates is that overall program costs are expected to increase by 48% between 2011 and 2015. Most of this increase in costs is related to the planned introduction of new vaccines: HPV in 2012 and PCV in 2012 and rotavirus in 2015.

Projection of Future Resource Requirements**



Summary of Program Costs 2011 – 2015

	Costs	Future Cost Projections					
	2010	2011	2012	2013	2014	2015	Total 2011 - 2015
	US$	US$	US$	US$	US$	US$	US$
Vaccine Supply and Logistics	$68,738	$80,610	$293,054	$285,920	$293,276	$346,681	$1,299,541
Service Delivery	$143,460	$146,329	$149,256	$152,241	$155,286	$158,391	$761,503
Advocacy and Communication	$5,000	$10,200	$52,020	$10,612	$5,412	$5,520	$83,765
Monitoring and Disease Surveillance	$600	$5,712	$6,034	$6,155	$6,278	$6,404	$30,583
Programme Management	$71,840	$139,017	$100,420	$71,340	$70,042	$92,965	$473,784
Supplemental Immunization Activities	$100,000		$77,399			$82,692	$160,091
Shared Health Systems Costs	$396,984	$404,923	$413,022	$421,282	$429,708	$438,302	$2,107,236
	$786,621	**$786,792**	**$1,091,205**	**$947,550**	**$960,002**	**$1,130,955**	**$4,916,504**

Implications on the budget with introduction of Pentavalent vaccine: Kiribati introduced pentavalent vaccine containing Hib antigen in August 2008 with GAVI support. Based on

the principle of non-replacement of current government investment on EPI vaccines, the Kiribati co-financed the cost of pentavalent at the rate of US $ 1 per dose pentavalent vaccine from 2008 to 2010. Introduction of pentavalent vaccine increased the total vaccine costs from $20,005 to $39, 807 in 2009. With graduation of Kiribati from GAVI support, Kiribati needs to finance the full cost from January 2016, which implies doubling of government vaccine budget from 2010 levels. In addition, as per GAVI graduation policy, Kiribati will be required to slowly increase its cofinancing levels.

Implications on the budget with introduction of PCV-13 vaccine: If approved, the GAVI will support the vaccine (along with cofinancing by the government) only till December 2015, after which the country will be required to pay the full cost of the vaccine to UNICEF. The price of the pneumococcal vaccine though UNICEF under AMC mechanism is likely to be $3.5 per dose in January 2016. Vaccine co financing by the government has been estimated at GAVI recommended rates commencing at 70 cents per dose in 2012 and extending to 2.80 per dose by 2015. The Government would therefore take up 100% of the financing of the vaccine from 2016.

The co-financing contribution for PCV13 for the Government is estimated at $4,805 in 2012, increasing to $29,572 in 2015 until the full cost of $36,965will be borne in 2016.

Implications on the budget with introduction of HPV vaccine: HPV vaccine in this plan has been costed at $15 per dose (3 dose schedule) reaching 90% of 12 year old girls (approx. 3,000 per annum). The cost of this is in the vicinity of $15000 - $18000 per year, which is 38% of total vaccine costs in 2013. At the stage of preparation of this cMYP, there was a plan to finance the cost of this vaccine through donation from Merck up to 2014, after which the vaccine will be financed by the Government.

There is also a planned introduction of rotavirus vaccine in 2015 although the financing source for the introduction has not yet been identified.

Overall budget implications:

If Kiribati introduces planned new vaccines (PCV-13, and HPV and rotavirus) in routine immunization, the total vaccine supply and logistics will increase from $39,032 in 2010 to $303,486 in 2015. Financial support may be available between 2011 and 2015 from GAVI for PCV-13 and pentavalent vaccine, and from merck for HPV vaccine. The government will need to mobilize the rest of the resources especially the funding for HPV and rotavirus vaccine in 2015.

4.2 Injection equipment and supplies for routine EPI programme

AD syringes and safety boxes have been procured for routine immunization services since 2006. It is estimated that the total cost of the AD syringes and safety boxes will increase from US $ 2,404 in 2010 to $ 5,389 in 2015 if all the planned new introductions are implemented. For the period 2010-2015, the funding of AD syringes will be co-

shared between GAVI and the Government, GAVI funding syringes used for pentavalent and PCV-13 vaccine, the government funding the rest.

4.3 Cold Chain equipment and maintenance

A cold chain and vaccine management improvement plan has been drafted (2011-2013), which focuses on completing installation of existing solar equipment and provision of accessories, as well as procurement of additional equipment and capacity building of staff. The extension of the solar refrigeration system at the health centre level has also been costed in this plan, although a funding source is not yet identified.

More vaccine carriers are needed urgently to ensure all health centres and dispensaries have adequate supplies. This is becoming more urgent with the planned introduction of more vaccines in single dose vial presentations (HPV and PCV-13).

4.4 Cost of transportation

Transport is required to enable vaccine distribution, outreach immunization session and supervision visit. The Ministry of Health has provided 60 motorcycles to health centres and some dispensaries that cover large areas with very scattered population. There is an annual operational budget for motorcycles but no budget confirmed for any additional motor cycles, cars or boats that could support EPI work in 2011-2015.

Due to the isolation and remoteness of many outer islands, effective communication systems for reporting disease outbreaks and immunization coverage are needed. Currently there were only six Outer Islands have functioning solar radio/telephones.

The current cMYP proposes the procurement of additional motorcycles, boats and vehicles and communication equipment in order to provide improved access to immunization and other health services. It should be noted that as services are provided in an integrated manner, transport costs are considered as "shared health system" costs and are not program specific. Shared transport costs range from $94,128 in 2010 to $103,924 in 2015.

4.5 Personnel cost

The personnel costs are calculated as a percent of time devoted to EPI by each category of staff at all the levels (national, health centres and dispensaries) . The cost is an estimated annual income. The detail of calculations is included in the excel file at Doc Seven. One hundred percent (100%)of these costs will be financed through government of Kiribati.

4.6 Operational costs on routine immunization

The unit cost to fully immunize one child is $100.60 in 2010. Total recurrent costs for the plan period are $2.4 million including vaccine and injection supply costs. Shared transportation costs over the plan period are $499,640, reflecting the high cost of the program in reaching out to the population. There are also significant investments in

training ($148,000) and program management ($106,162) in order to meet the demands in the next plan period for new vaccine introductions and coverage improvement. Training and supervision are critical investments of the immunization programme but a review of the quality of these activities may be needed to increase effectiveness and reduce cost.

The ongoing operational costs for routine immunization will be shared between the government and international donors. The government will cover the cost of fuel and some transport. WHO and the EU will support integrated supportive supervision and policy, JICA training and UNICEF training, supervision and other related activities.

For the year 2012, GAVI will support the funds of up to US $ 100,000 to support training, intensified supervision, social mobilization activities and mass media campaigns to support the introduction of the PCV-13 vaccine and strengthen the current immunization systems.

4.7 Cost and financing of vaccination campaigns

A campaign with measles and rubella vaccine targeting children aged 1-4 years was implemented in 2010. The next planned measles SIA are for 2012 and 2015 for children aged 12-47 months at an estimated cost of $7 per child.

UNICEF may provide funding for the next campaign and JICA will supply AD syringes and safety boxes. WHO will commit itself to external technical assistance.

4.8. Summary of financial status and sustainability of immunization program in 2011-2015

The cost includes capital costs, annual recurrent costs and the cost of conducing immunization campaigns. The estimated cost of fully immunizing one child is very high compared to other countries including Pacific Island countries. The cost of training and supervision is high and while both are essential to improve the quality of the immunization service they both need to be delivered to a high standard to be effective.

As well as funding all traditional vaccines, the Government will co finance pentavalent vaccine according to the recommended GAVI rate for co-financing. This would also apply to PCV vaccine should application to GAVI be successful. The Ministry of Health will also fund outreach activities done by all health facilities, provide motorcycles and other costs associated with outreach.

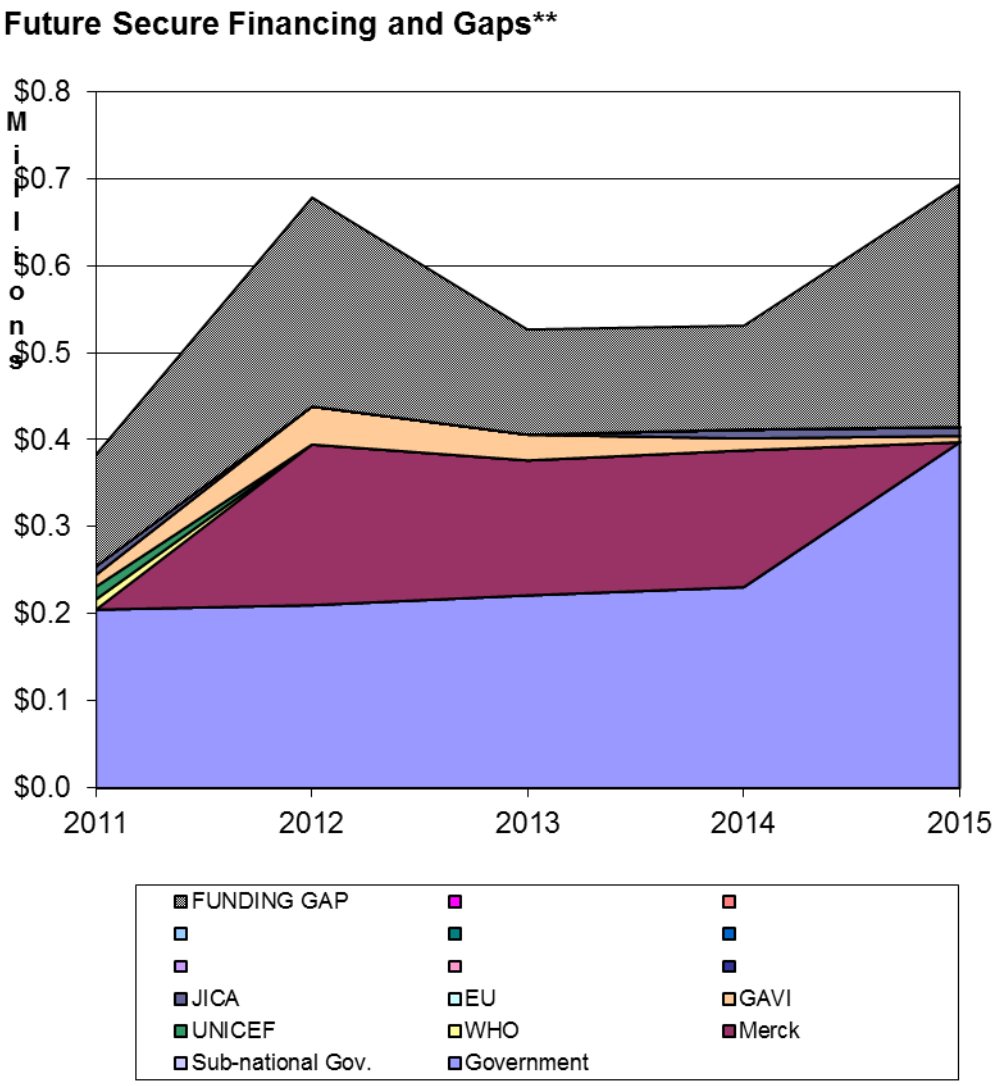
The Pacific Immunization Progamme Strengthening (PIPS) Partners, including WHO, UNICEF, JICA, recognized that Kiribati as a priority country. UNICEF has allocated adequate funds accordingly. WHO will continue to provide technical support. The EU Outer Island Health System Strengthening project will contribute to maintaining the cold chain equipment, improving data quality and communication between the central and

outer islands, health waste management. JICA is contributing to the areas of supporting training, improving cold chain system status and safety injection.

As the financing graph demonstrates below, the main funding gaps relate to program activities and to financing of new vaccines in 2015. Due to co financing arrangements with GAVI and donations from Merck, in addition to the finance of traditional vaccines by Government, the funding of vaccines is relatively secure.

There are also potential funding gaps for program activities including IEC and program management and measles campaigns in 2012 and 2015. Shared transport costs and cold chain also have significant financial gaps.

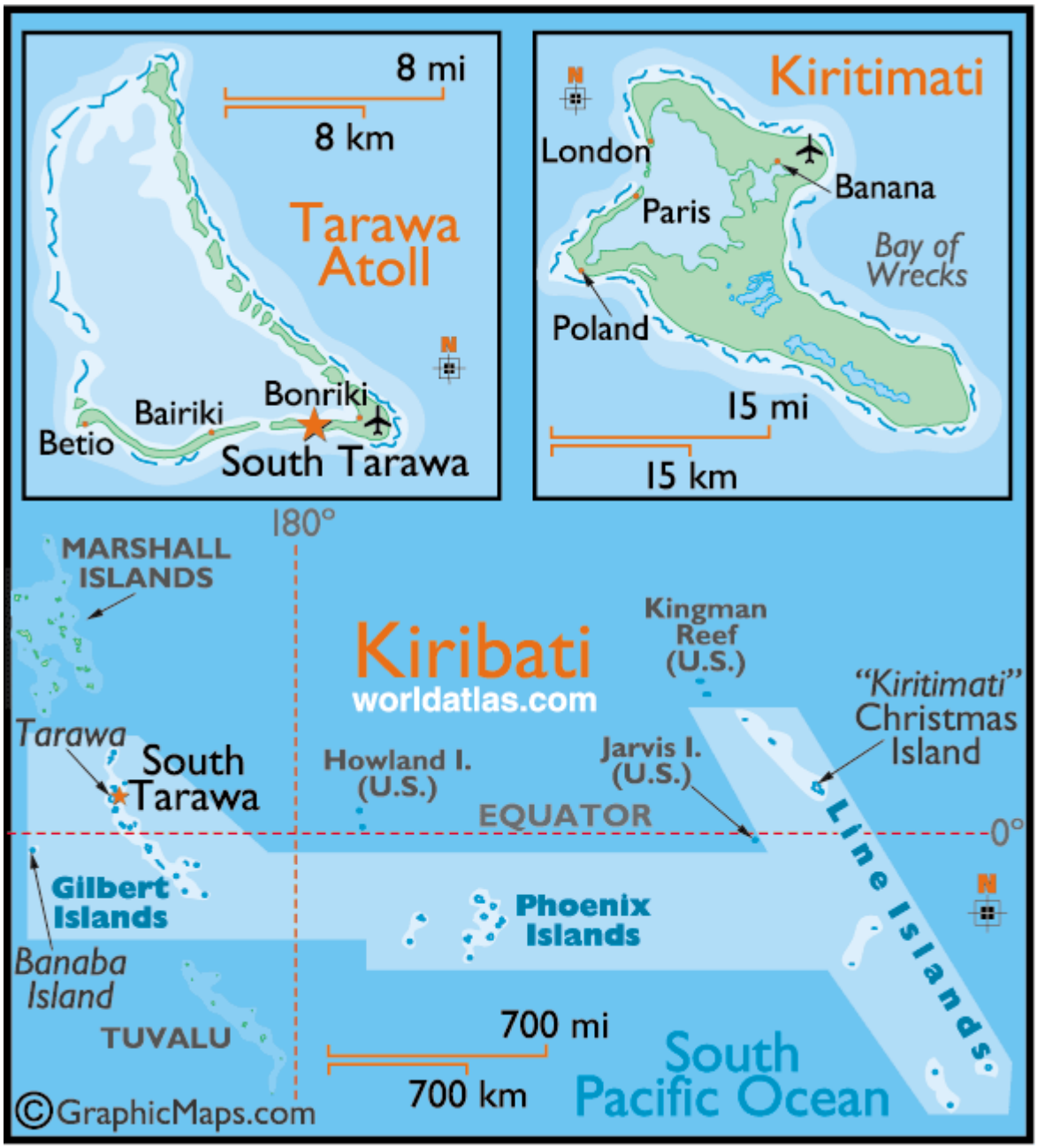
Summary of Financial Gaps 2011 – 2015.



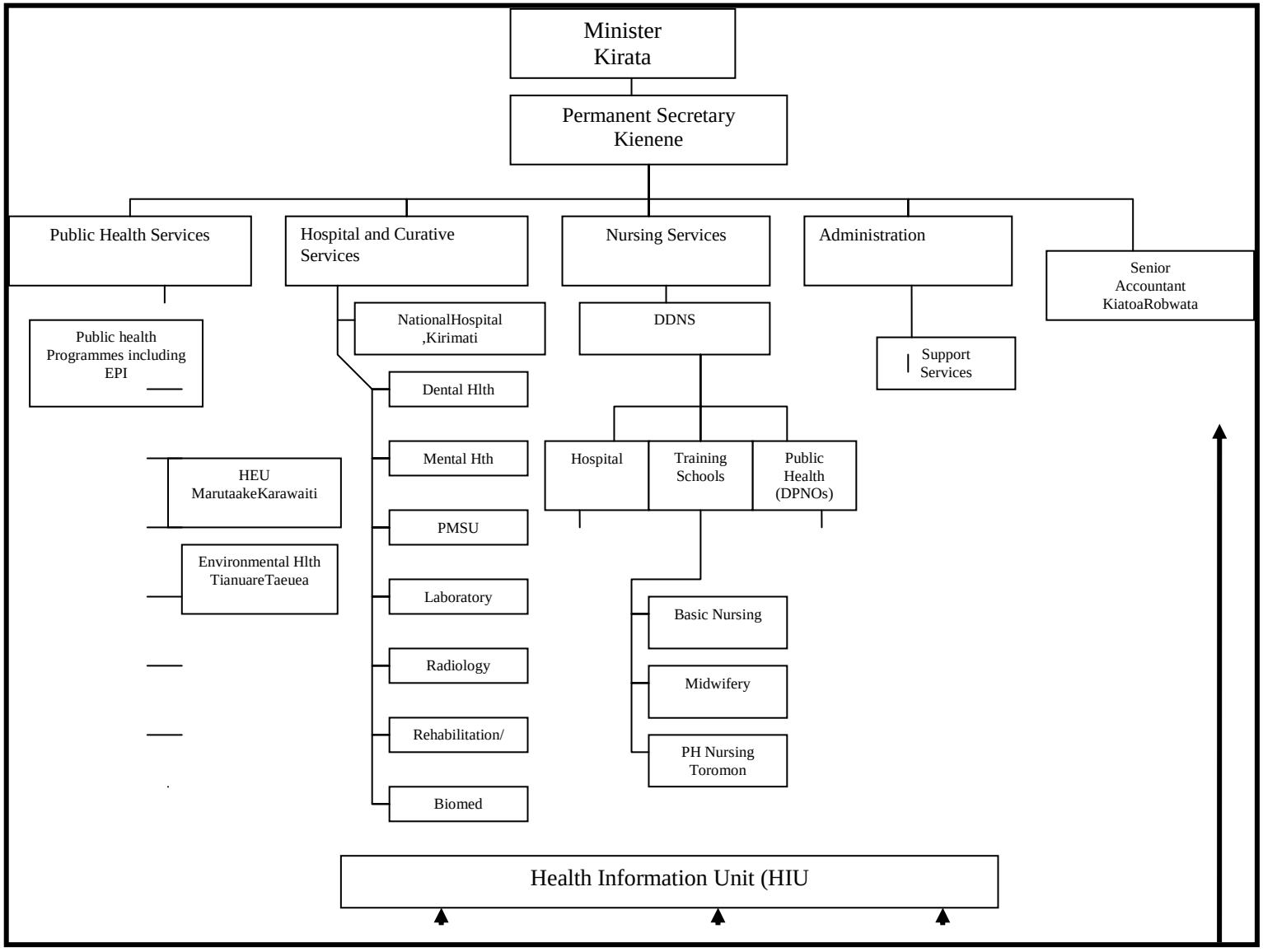
Summary of Costs by Component for Kiribati EPI program 2011- 2015

	Costs	Future Cost Projections					
	2010	2011	2012	2013	2014	2015	Total 2011 - 2015
	US$	US$	US$	US$	US$	US$	US$
Vaccines (routine vaccines only)	$39,032	$40,300	$247,697	$231,154	$232,653	$303,486	$1,055,291
Traditional	$11,820	$12,044	$11,624	$11,855	$12,174	$12,487	$60,184
Underused	$27,212	$28,256	$29,062	$29,658	$30,547	$31,564	$149,086
New			$207,011	$189,642	$189,933	$259,436	$846,021
Injection supplies	$2,404	$3,285	$4,948	$5,168	$5,234	$5,389	$24,024
Personnel	$143,460	$146,329	$149,256	$152,241	$155,286	$158,391	$761,503
Salaries of full-time NIP health work							
Per-diems for outreach vaccinators/	$143,460	$146,329	$149,256	$152,241	$155,286	$158,391	$761,503
Per-diems for supervision and monit							
Maintenance and overhead	$5,109	$6,380	$6,557	$7,958	$8,765	$5,225	$34,885
Cold chain maintenance and overhe	$5,109	$6,380	$6,557	$7,958	$8,765	$5,225	$34,885
Maintenance of other capital equipm							
Building overheads (electricity, wate							
Short-term training		$76,500	$31,212	$7,428	$5,412	$27,602	$148,155
IEC/social mobilization	$5,000	$10,200	$52,020	$10,612	$5,412	$5,520	$83,765
Disease surveillance	$600	$5,712	$6,034	$6,155	$6,278	$6,404	$30,583
Programme management	$25,000	$20,400	$20,808	$21,224	$21,649	$22,082	$106,162
Other routine recurrent costs	$46,840	$42,117	$48,400	$42,688	$42,981	$43,281	$219,467
Subtotal	**$267,446**	**$351,224**	**$566,932**	**$484,628**	**$483,670**	**$577,380**	**$2,463,834**
Vehicles							
Cold chain equipment	$22,192	$30,644	$33,852	$41,640	$46,625	$32,581	$185,342
Other capital equipment							
Subtotal	**$22,192**	**$30,644**	**$33,852**	**$41,640**	**$46,625**	**$32,581**	**$185,342**
Measles Rubella	$100,000		$77,399			$82,692	$160,091
Vaccines and Injection Supplies			$6,178			$7,111	$13,289
Operational costs	$100,000		$71,222			$75,581	$146,802
Subtotal	**$100,000**		**$77,399**			**$82,692**	**$160,091**
Shared personnel costs	$302,856	$308,913	$315,091	$321,393	$327,821	$334,377	$1,607,596
Shared transportation costs	$94,128	$96,010	$97,930	$99,889	$101,887	$103,924	$499,640
Construction of new buildings							
Subtotal	**$396,984**	**$404,923**	**$413,022**	**$421,282**	**$429,708**	**$438,302**	**$2,107,236**
TOTAL	**$786,621**	**$786,792**	**$1,091,205**	**$947,550**	**$960,002**	**$1,130,955**	**$4,916,504**
Routine Immunization	**$686,621**	**$786,792**	**$1,013,806**	**$947,550**	**$960,002**	**$1,048,263**	**$4,756,412**
Supplemental Immunization Activi	**$100,000**		**$77,399**			**$82,692**	**$160,091**

Annex 1 Map of Kiribati



Annex 2 Organization Chart of Ministry of Health in Kiribati



Annex 3 Cold Chain and Vaccine Management Improvement Plan

Cold Chain and Vaccine Management Improvement Plan for Kiribati (2011-2013)

Sn	Findings	Recommendations/Timeline		
		2011	2012	2013
1	Solar arrays for the 18 solar powered vaccine refrigerators/ freezers were roof mounted with either incorrect tilt angle or direction. 10 out of the 18 solar powered units (Dulas model) are non-operational due to the absence of preventive maintenance. One of the 6 solar chill vaccine refrigerators was installed in	1.1 Fabricate additional 5 galvanized pole and frame to install the remaining 5 solar chill vaccine refrigerator units to replace the non-operational solar vaccine refrigerator. 1.2 Install the remaining 5 solar chill vaccine refrigerator units. 1.3Procure 6 additional solar chill vaccine refrigerators to replace the non-operational units. 1.4 Fabricate 6 sets of galvanized pole and frame. 1.5 Install the 6 newly procured solar chill vaccine refrigerator units. 1.6 Procure 11 sets of basic tools	1.1 Fabricate galvanized pole and frame corresponding to the number of operational Dulas model solar powered vaccine refrigerator. 1.2 Re-install Dulas vaccine refrigerator units using a galvanized pole and frame. 1.3 Procure sets of basic tools and materials for preventive maintenance of the units including aluminum ladders. 1.4 Conduct hands on training to health center staff on preventive maintenance and the use of basic tools. The solar chill Users' Manual (which includes preventive maintenance of the solar chill	1.1 Procure additional solar chill vaccine refrigerator for health centers. 1.2 Fabricate sets of galvanized pole and frame. 1.3 Install the newly procured solar chill vaccine refrigerator units. 14. Procure sets of basic tools and materials for the preventive maintenance of solar chill units. 1.5 Conduct hands on training to health center staff on preventive maintenance and the use of basic tools. The solar chill Users' Manual (which

Sn	Findings	Recommendations/Timeline		
		2011	2012	2013
	Abaokoro Health Center in North Tarawa. One set of tools and materials was provided to the health center staff for preventive maintenance. Another set of tools and materials was provided to the Central Pharmacy technician for installation and maintenance. Hands-on training was provided to both staff on the use of tools and preventive maintenance of solar chill vaccine refrigerator unit.	and materials for the preventive maintenance of solar chill units. 1.7 Procure 12 sets of aluminum ladder for each health center with pole mounted solar powered vaccine refrigerator units. 1.8 Conduct hands on training to health center staff on preventive maintenance and the use of basic tools. The solar chill Users' Manual (which includes preventive maintenance of the solar chill vaccine refrigerator) will be used as reference and guide.	vaccine refrigerator) will be used as reference and guide.	includes preventive maintenance of the solar chill vaccine refrigerator) will be used as reference and guide
3	Ambient temperature of the	3.1 Install two split type air conditioners (i.e. 1.5 tons cooling		

Sn	Findings	Recommendations/Timeline		
		2011	2012	2013
	room is high due to poor ventilation.	capacity each) to prevent high ambient temperature inside the room.		
4	Positive storage capacity is insufficient with the introduction of new vaccines (PCV13, HPV and Rota).	4.1 Procuretwo ILR MK 304 to increase positive storage capacity from 540 liters to 756 liters. 4.2 Utilize the two deep freezers MF 314 for Polio, MR and BCG vaccines to increase the positive storage capacity and to freeze icepacks.	4.1 Procure one deep freezer MF 314 to increase freezing storage capacity and for freezing of icepacks.	4.1 Procure ILR MK 304 as backup for health centers with electricity.
5	Cold boxes and vaccine carriers are not sufficient.	5.1 Provide at least 1 cold box and 2 vaccine carriers with ice packs for each health center.	5.1 Provide at least one vaccine carrier with ice packs for each dispensary.	
6	Spare parts for different models of cold chain equipment are not readily available.	6.1 Procure fast moving spare parts for cold chain equipment particularlyfor the solar powered vaccine refrigerators. These include among others: Fuse (15 amps and 3 amps), fan motor, diode, voltage regulator, thermostat, etc.	6.1 Procure fast moving spare parts for cold chain equipment particularly for the solar powered vaccine refrigerators.	6.1 Procure fast moving spare parts for cold chain equipment particularly for the solar powered vaccine refrigerators.

Sn	Findings	Recommendations/Timeline		
		2011	2012	2013
7	There is no continuous temperature recorder in the refrigerator.	7.1 Provide at least two log tag recorders for monitoring temperature of the refrigerator and freezer at the central level. 7.2 Provide fridge tag and freeze tag for every refrigerator at central, health center and dispensary levels.	7.1 Provide fridge tag and freeze tag for everynewly installed vaccine refrigerator, central, health center and dispensary level.	7.1 Provide fridge tag and freeze tag for everynewly installed refrigerator at central, health center and dispensary level.
8	There is no cold chain staff who is responsible for the vaccine store i.e. for keeping and maintaining the temperature records, vaccine stock records, and distribution status of the vaccines; and for conducting preventive maintenance of the cold chain equipment.	8.1 UNICEF to recruit and hire at least one staff who will assist the EPI Coordinator in maintaining correct temperature of vaccines and sustaining the operation of cold chain equipment. 8.2 Conduct hands on training for the cold chain staff on cold chain equipment repair and maintenance, vaccine storage, vaccine distribution and cold chain logistics.		
9	Knowledge and		9.1 Conduct training on cold	9.1 Conduct training on

Sn	Findings	Recommendations/Timeline		
		2011	2012	2013
	skills of health staff (at all levels) on cold chain and vaccine management needs improvement.		chain and vaccine management to staff at central and health center levels.	cold chain and vaccine management to staff at the dispensary levels.
10	There is no standard operating procedure (SOP) in case cold chain breakdown occurs at the different levels of the cold chain system.		10.1 Develop SOP for each level of the cold chain system.	10.1 Conduct training to health staff at central, health center and dispensary level on the use of the SOP.

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