Training conducted for health workers from 2005-2008

Year	Type of Training	Nos. of persons trained	Remarks
2005	Training of BHU in charges on Immunization	11 Health Assistant	
2005	2 weeks training on Refrigerator repair & maintenance	2 EPI Technician 1 Health Equipments Repair Maintenance (HERM)	
2005	Training of Trainer (ToT)on integrated Vaccine Preventable Disease Surveillance	13 Medical doctors 1 Royal Institute of Health Science	
2005	Data quality & self assessment training for immunization	19 District Health Supervisory Officers 1Program personnel 2 1 from Health Information Unit (HIMS)	
2006	Congénital Rubella Syndrome Surveillance, AFP, MNT & Néonatal Tetanus	9. District Heath Supervisory Officiers	
2007	5 days ToTs and training of other health workers on revised EPI manual	1.4 Medical Officers 1 tutor 17 MCH in charges 1 EPI cold store in charges	
2007	Training on lab technician in diagnosis of viral hepatitis for 3 months	One Technician from Public Health Laboratory trained in Bangkok	
2008	Training on revised EPI manual	77 Health Assistant 1 Assistant Clinical Officer 15. Basic Health Workers 3. District Heath Officers	

8．EPIマイクロプランの一例（Bumthang Hospital EPI Micro Plan for 2008-2009）

EPI Micro Plan for 2008-09 FY						
Dzongkhag					Bumthang	
BHU					Chumey	
Population					3668	
Total Infant 1.3%					48	
Total Children 1-2 Years					48	
Total pregnant mother 1.1X48					53	
No. of immunization session in BHU 1x12					12	
No. of immunization session in ORC 4x12					48	
Total No. of session in a year BHU+ORC					60	
Items	**No. of benif.* doses*wf**	**Total doses/year**	**Total vials/ year**	**Actual requirement vials/ year**	**# Diluents/ AD syringes 1.1%**	**Reconst. Syringes 1.1%**
BCG	48*1*5	240	12	60	52.8	52.8
OPV	48*4*2	384	38.4	60	60 droper	0
DPT+HepB	48*3*2	288	144	144	158.4	0
MR	48*2*4	384	38.4	60	105.6	105.6
DT	48*1*2	96	9.6	60	52.8	0
TT	53*2*3	318	31.8	60	106	0

EPI Micro Plan for 2008-09 FY						
Dzongkhag					Bumthnag	
BHU					Ura	
Population					1796	
Total Infant 1.3% of Pop. Or (actual # of infant)					45	
Total Children 1-2 Years					NA	
Pregnant mother 1.1% of infant or (actual # of pregnant mother)					50	
No. of immunization session in BHU/ hosp.					12	
No. of immunization session in ORC					36	
Total No. of session in a year BHU/ hosp. + ORC					48	
Items	**No. of benif.* doses*wf**	**Total doses/year**	**Total vials/ year**	**Actual requirement vials/ year**	**# Diluents/ AD syringes 1.1%**	**Reconst. Syringes 1.1%**
BCG	45*1*5	225	11.25	48	49.5	49.5
OPV	45*4*2	360	36	48	48 droper	0
DPT+HepB	45*3*2	270	135	135	148.5	0
MR	45*2*4	360	36	48	99	99
DT	45*1*2	90	9	48	49.5	0
TT	50*2*3	300	30	48	100	0

EPI Micro Plan for 2008-09 FY						
Dzongkhag					Bumthnag	
BHU					Tang	
Population					2063	
Total Infant 1.3% of Pop. Or (actual # of infant)					36	
Total Children 1-2 Years					NA	
Pregnant mother 1.1% of infant or (actual # of pregnant mother)					47	
No. of immunization session in BHU/ hosp.					12	
No. of immunization session in ORC					48	
Total No. of session in a year BHU/ hosp. + ORC					60	
Items	**No. of benif.* doses*wf**	**Total doses/year**	**Total vials/ year**	**Actual requirement vials/ year**	**# Diluents/ AD syringes 1.1%**	**Reconst. Syringes 1.1%**
BCG	36*1*5	180	9	60	39.6	39.6
OPV	36*4*2	288	28.8	60	60 droper	0
DPT+HepB	36*3*2	216	108	108	118.8	0
MR	36*2*4	288	28.8	60	79.2	79.2
DT	36*1*2	72	7.2	60	36*1.1	0
TT	47*2*3	282	28.2	60	94	0

EPI Micro Plan for 2008-09 FY						
Dzongkhag					Bumthnag	
BHU					Zhabjithang	
Population					443	
Total Infant 1.3% of Pop. Or (actual # of infant)					20	
Total Children 1-2 Years					NA	
Pregnant mother 1.1% of infant or (actual # of pregnant mother)					26	
No. of immunization session in BHU/ hosp.					12	
No. of immunization session in ORC					12	
Total No. of session in a year BHU/ hosp. + ORC					24	
Items	**No. of benif.* doses*wf**	**Total doses/year**	**Total vials/ year**	**Actual requirement vials/ year**	**# Diluents/ AD syringes 1.1%**	**Reconst. Syringes 1.1%**
BCG	20*1*5	100	5	24	22	22
OPV	20*4*2	160	16	24	24 droper	0
DPT+HepB	20*3*2	120	60	60	66	0
MR	20*2*4	160	16	24	44	44
DT	20*1*2	40	4	24	22	0
TT	26*2*3	156	15.6	24	52	0

EPI Micro Plan for 2008-09 FY						
Dzongkhag					Bumthang	
BHU/ Hospital					Wangdicholing	
Population					7220	
Total Infant 1.3% of Pop. Or (actual # of infant)					149	
Total Children 1-2 Years					0	
Pregnant mother 1.1% of infant or (actual # of pregnant mother)					165	
No. of immunization session in BHU/ hosp.					108	
No. of immunization session in ORC					36	
Total No. of session in a year BHU/ hosp. + ORC					144	
Items	**No. of benif.* doses*wf**	**Total doses/year**	**Total vials/ year**	**Actual requirement vials/ year**	**# Diluents/ AD syringes 1.1%**	**Reconst. Syringes 1.1%**
BCG	149*1*5	745	37.25	144	163.9	163.9
OPV	149*4*2	1192	119.2	144	144 droper	0
DPT+HepB	149*3*2	894	447	447	491.7	0
MR	149*2*4	1192	119.2	144	327.8	327.8
DT	149*1*2	298	29.8	144	163.9	0
TT	165*2*3	990	99	144	330	0

EPI Micro Plan for 2008-09 FY						
Dzongkhag					Bumthang	
Population					14978	
Total Infant 1.3% of Pop. Or (actual # of infant)					298	
Pregnant mother 1.1% of infant or (actual # of pregnant mother)					341	
No. of immunization session in BHU/ hosp.					156	
No. of immunization session in ORC					180	
Total No. of session in a year BHU/ hosp. + ORC					336	
Items	**No. of benif.* doses*wf**	**Total doses/year**	**Total vials/ year**	**Actual requirement vials/ year**	**# Diluents/ AD syringes 1.1%**	**Reconst. Syringes 1.1%**
BCG	298*1*5	1490	74.5	336	369.6	369.6
OPV	298*4*2	2384	238.4	336	336 droper	0
DPT+HepB	298*3*2	1788	894	894	983.4	0
MR	298*2*4	2384	238.4	336	369.6	369.6
DT	298*1*2	596	59.6	336	369.6	0
TT	341*2*3	2046	204.6	336	682	0

Activity Report

Bumthang
District Level All

Bhutan, HMIS

For the Annual of 2007

ANC And Delivery

Ante Natal Care	1st Visit	288	2nd Visit	305	3rd Visit	222	More Visits	243
TT+2 (Only for Pregnant Women		28						
Attended Deliveries	Home	22	Facility	109	No. taken by forceps/vaccum			0

Child Clinic Attendance

Attendances	*New*	*Old*
No. of children < 1 year	236	2318
No. of children 1 to 5 years	26	3035

Nutritional Status	*No*
No. of children with overweight	865
No. with normal weight	3870
No. with malnutrition grade I	285
No. with malnutrition grade II	40
No. with malnutrition grade III	16
No. of Children given Vitamin A (age=<1 Year)	232

Infant Immunisation (0-11 months)

Vaccines	1	2	3
OPV	266	265	276
DPT - Hep B	266	265	276

BCG	264
Polio "0"	196
Measles & Rubella (MR)	345

No. fully immunised	274

Family Palnning

IUD	13	Oral Pills	1593	DMPA	1746	Condoms distributed	80910	

Stock-out of Essential Drugs

INH:		ORS:	
Cotrimoxasole:		DMPA:	
Doxycycline:		Vit A capsules:	1
Antibiotic eye Ointment:		Iron tablets:	
Aluminium Hydroxide:		Polio vaccine:	
Chloroquine:		TT vaccine:	
Hydroclorothiazid:	1	Albendazole:	
Hydralazine:		Rabies anti-venom:	1

Laboratory Examinations (No.)

Total No. of Lab-Tests:	689
Haemoglobin:	332
Blood grouping:	134
Malaria slides:	0
TB sputum:	0
Urine:	350
Stool:	1
HIV:	0

HOSPITALS Only

Total Admissions:	0	Absconded:	0	Patient Days:	0

Surgical Procedures

	Major	Minor	Laparoscopic
Caesarian Section	0		
General : Abdominal	0	0	0
General : Others	0	0	0
Orthopaedic : Extremities	0	0	0
Orthopaedic : Others	0	0	0
Gynaecology	0	0	0
ENT	0	0	0
Eye	0	0	0

Diagnostic Procedures (No.)

X-Ray Chest:	0
X-Ray Extremities:	0
X-Ray Others:	0
Ultrasound Gyn/Obs:	0
Ultrasound Abdomen:	0
Ultrasound Others:	0

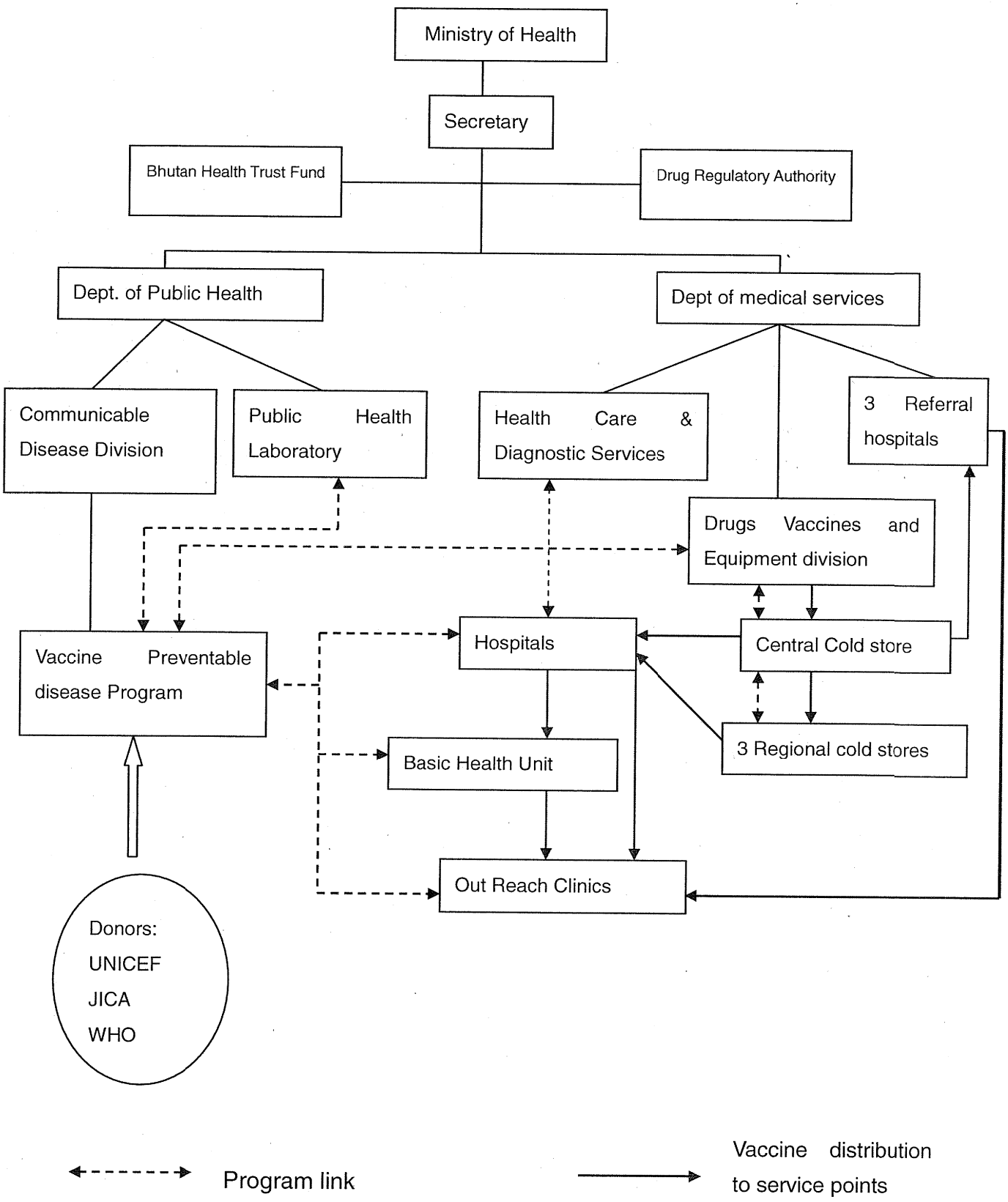
Dental Services

Prophylaxis:	0
Scaling:	0
Fillings:	0
Extractions:	0
Dental Others:	0

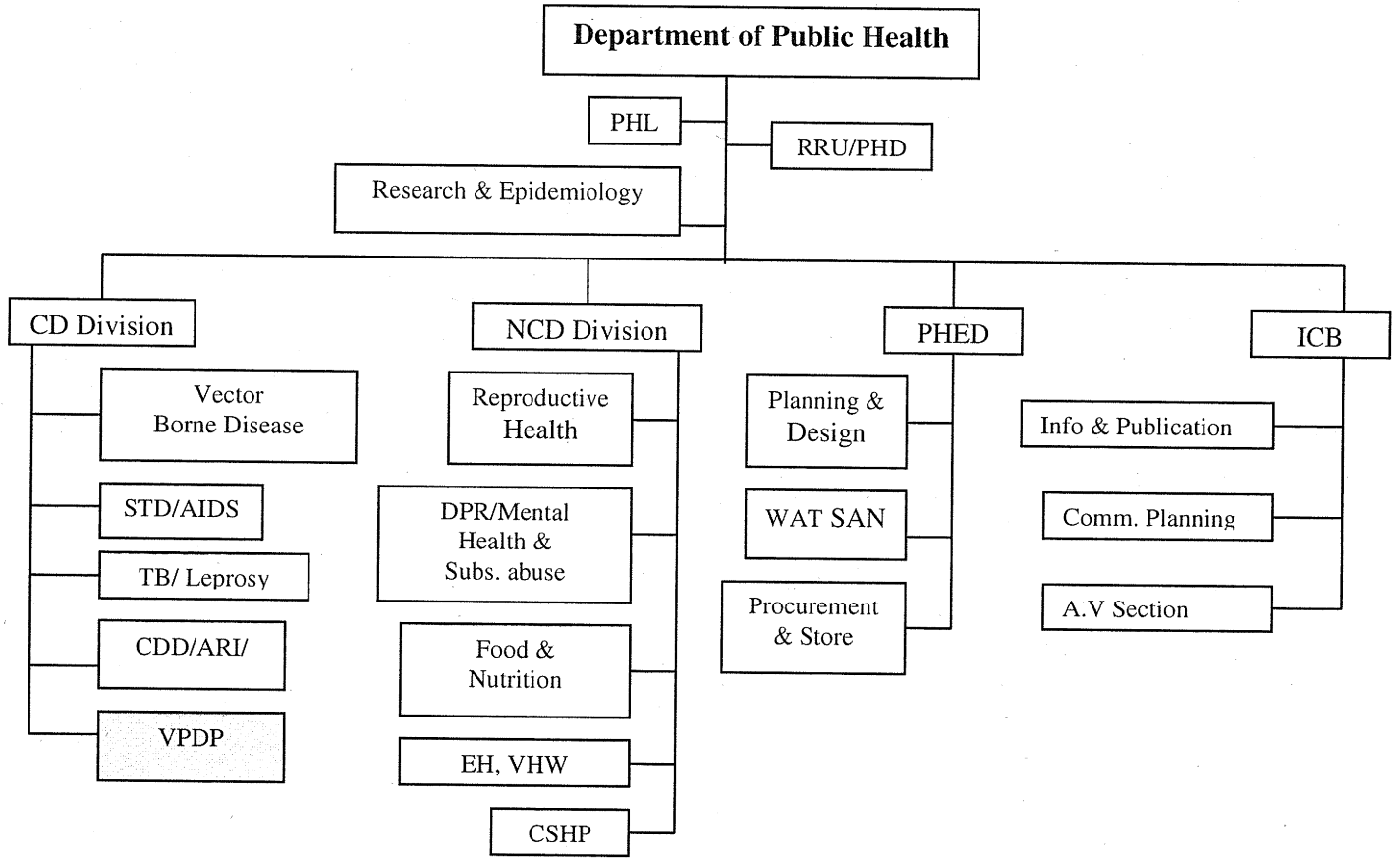
BHUs Only

Total Admissions:	26
Delivery Admissions:	18

Organization of Vaccine Preventable Disease Program



Organogram of the Department of Public Health



BHUTAN HEALTH TRUST FUND

Background

Guided by a firm political will, and confident in strong foundation of a well-knit health infrastructure, the Royal Government of Bhutan (RGoB) is exploring innovative and sustainable financing mechanism for the priority components of its primary health care services. To continue its preventive programmes and to provide basic curative services, the availability of vaccines & essential drugs, including needles and syringes is crucial. At present, the cost of the vaccines and the drugs accounts for almost 50% of all expenditure in the national health sector, leaving uncertainties in the future. Therefore, the establishment of a "Health Trust Fund" of US$24 million would eliminate the uncertainties and generate sufficient income to meet the cost of these critical components of the health services in Bhutan.

Hence, the "Bhutan Health Trust Fund" was initiated in 1997 and formally launched at the WHO Headquarters in Geneva on 12 May 1998.

Objective

The primary objective of the establishment of Bhutan Health Trust Fund is to ensure continued and timely supply of vaccines and essential drugs and to eliminate uncertainties for the financing of these crucial components of the health services. The Fund envisages an investment to generate sufficient returns to cover all annual expenditure on vaccines and essential drugs. By ensuring the financing of these crucial components through a Trust Fund, the RGoB can re-direct the national health budget to other key elements of public health care or in developing human resources and strengthening health infrastructure.

Target and Current Status of the Fund

The initial target of the Fund is to mobilize **US $ 24 million** by end June 2008.

As of end March 2008, a total of about **US $ 22.5 million** has been mobilized including interest from the accumulated fund. (The Fund is invested both within and outside the country). This is **US $ 1.5 million** short of the targeted amount.

Capitalization of the Fund.

The capitalization of the Fund is done through contributions from potential donor countries/organizations of private and public status/financial institutions as well as individuals with matching contributions from the Royal Government on the principle of one-to-one partnership.

Any contribution made by local donors is tax exempt vide Ministry of Finance approval No. DRC/TP-28/2000/5153 dated 23/11/2000. US tax exemption on the investment of the Fund has been obtained under Internal Revenue Code Section 501 (C) (4).

The Fund accumulated thus far has been capitalized through various donors as follows:

Royal Government of Bhutan	11,801,102.80
Bill & Melinda Gates Foundation	1,000,000.00
The Summit foundation	1,000,000.00
Government of Norway	988,371.88
Dr. Frederick Paulsen Foundation Inc.	99,945.00
Government of Australia	63,850.00
Government of New Zealand	53,374.33
Private Sector of Bhutan	50,587.36
Mr. Andrew Evans, Canada	50,000.00
Mr. Mandanjeet Singh	49,989.00
Schools/2006 Graduates	43,166.45
Dr. Franz H. Rhomberg	38,568.38
UNICEF	15,000.00
International Bhutan Foundation	10,000.00
Dr. Richard Harvey & Friends	9,682.69
Save the Children, US	5,000.00
Walk sponsorship	1,560,228.91
Others	40,908.90
Surplus income including interest	5,707,768.58
Grand Total	22,587,544.28

Activities Being Undertaken to Mobilize Funds

(a) The matter is being pursued with all potential bilateral/multilateral donors including private foundations and other private individuals.

(b) A press release entitled " Royal Government of Bhutan receives grant from the Bill & Melinda Gates Foundation and Summit Foundation to Improve Health Services" has been globally issued on 5 October 2000 to raise awareness of the Fund and to urge all the potential international donors to respond to the Fund appropriately. These stories have been picked up by Agence France-Pressee and Times of India on 6 October 2000. Same stories have also been broadcast by BBS on 6 October 2000 and published in 7-13 October 2000 issue of Kuensel.

(c) Brochures entitled "A One-to-One Partnership for Sustainability of Primary Health Care" and "A WALK ACROSS BHUTAN TO SUSTAIN HEALTH" have been published and are under active distribution amongst all potential donors.

(d) Website is hosted in order to disseminate information of the Fund globally. For more information, please log on to www.bhtf.gov.bt.

(e) In keeping with 2002 WHO theme of "Move for Health", a long walk from the eastern tip of the country to the capital city of Thimphu covering a distance of more than 500 kms was undertaken by then Hon'ble Minister of Health & Education accompanied by six members from 25 September to 10 October 2002. The objective of the walk was to create awareness and reinforce interest in physical activities and to raise fund for the Bhutan Health Trust Fund. This historic walk generated about US$1.560 million.

(f) A booklet entitled " The Genesis of Support and Solidarity" has been printed and distributed to the concerned donors to express our gratitude to them for the generous support extended to the resounding success of the Move for Health Walk 2002 and urging one and all to continue to contribute generously so that the initial target can be achieved within the shortest possible time.

(g) We continue to use the services of Bhutan Foundation (New York), International Bhutan Foundation (Geneva), American Himalayan Foundation, Friendship Associations Consulate Offices and Bhutanese Missions Abroad.

(h) Preparation of Move for Health and Happiness (Second Walk) is being initiated.

SHORT BACKGROUND, OBJECTIVE AND STATUS OF BHUTAN HEALTH TRUST FUND AS OF 31 MARCH 2008

1. BACKGROUND :

At the core of Bhutan's development philosophy lies the physical and spiritual well-being of its people within a safe and secure environment. Thus, investments in the social sector have always been accorded the highest priority. However, the sustainability of past accomplishments and future initiatives has become a daunting challenge for Bhutan as a least developed country (LDC). In the vital sector of health, the key concern of the Royal Government of Bhutan (RGoB) is how to enhance the accessibility and quality of primary health care services against rising costs and competing needs. The idea of a Health Trust Fund presents itself as a novel and dependable alternative for financing the priority needs of vaccines, essential drugs and needles & syringes.

2. DATE OF INITIATION/LAUNCHING:

Bhutan Health Trust Fund (BHTF) was initiated in 1997 and formally launched at the WHO Headquarters in Geneva on 12 May 1998. The launching of the Fund was attended by 35 participants including Helvetas, UNFPA, UNICEF and WHO.

3. OBJECTIVE:

The primary objective of the Fund is to ensure continued and timely supply of vaccines and essential drugs and to eliminate financing uncertainties for purchase of these crucial components of the primary health care services.

4. FINANCING MECHANISM OF THE FUND:

The Fund envisages an investment to generate sufficient returns to cover all annual expenditure on vaccines and essential drugs. By ensuring the financing of these crucial components through a Trust Fund, the RGoB can re-direct the national health budget to other key elements of public health care or in developing human resources and strengthening health infrastructure.

5. TARGET:

The initial target of the Fund is to mobilize US$ 24 million.

10	Mr. Madanjeet Singh	49,989.00
11	Schools/2006 Graduates	43,166.45
12	Dr. Franz H. Rhomberg	38,568.38
13	UNICEF	15,000.00
14	International Bhutan Foundation	10,000.00
15	Richard Harvey & Friends	9,682.69
16	Save the Children US Bhutan Program	5,000.00
17	Walk Sponsorship	1,560,228.91
18	Others	40,908.90
19	Surplus income including interest	5,707,768.58
	Total	22,587,544.28

Progress in terms of percentage : 94.11 % (Say, 94 %)

Fund gap as of 31 March 2008 : US$ 1.5 million approximately

8. CAPITALISATION OF THE FUND:

The capitalization of the Fund is done through contributions from potential donor countries/organizations of private and public status/financial institutions as well as individuals with matching contributions from the Royal Government on the principle of one-to-one partnership.

9. OPERATIONALIZATION OF THE FUND:

The operationalization of the Fund has begun with effect from 2003-2004 financial year.

a. An amount of US$ 2,833.87 (Nu. 123,500.00) had been released to Department of Health (Now Department of Medical Services) for purchase of Hepatitis B vaccines during 2003-2004 financial year.

14. INVESTMENT OF THE FUND:

The Fund is currently invested in fixed deposits, short term deposits, Druk Air Bonds, etc. The average annual rate of returns from the above investment is around 5 %.

15. US TAX EXEMPTION STATUS ON THE INVESTMENT OF THE FUND:

US Tax exemption on the proposed investment of the fund has been received.

The Bhutan Foundation in New York was reorganized as a tax free organization in early June 2002 to facilitate contributions from both private and public organizations. Bhutan Foundation is tax exempt under US Internal Revenue Code Section 501 (c) (3).

The International Bhutan Foundation in Geneva has been established in March 2006 to tap possible contributions from potential Swiss donors.

16. BHUTAN TAX EXEMPTION :

All contributions made by the nationals of Bhutan are tax exempt vide Ministry of Finance Note No. DRC/TP-28/2000/5153 dated 23 November 2000.

17. LEGAL ENTITY OF THE BHUTAN HEALTH TRUST FUND:

A Royal Charter of Bhutan Health Trust Fund 2000 has been issued by the Royal Government on 3 August 2000 corresponding to fourth day of the sixth month of the Iron Male Dragon Year thereby confirming the legal entity of the Bhutan Health Trust Fund.

18. ESTABLISHMENT OF THE BHUTAN HEALTH TRUST FUND SECRETARIAT:

Bhutan Health Trust Fund Secretariat consisting of the Executive Director, Program Officer and two Office Secretaries has been established with effect from April 2000. One Finance Manager is expected to join in future.

19. PROCUREMENT AND DISTRIBUTION OF ESSENTIAL DRUGS AND VACCINES:

Various health centers around the country submit Six-monthly Drug Reports to the Drugs, Vaccines & Equipment Division (DVED), Department of Medical Services. These Reports are compiled by DVED to quantify the actual requirement of drugs and vaccines required by each health centre.

about US$ 1.560 million which greatly helped to strengthen the capitalization of the Fund.

(f) A booklet entitled "The Genesis of Support and Solidarity" has been printed and distributed to the concerned donors to express our gratitude to them for the generous support extended to the resounding success of the Move for Health Walk of 2002 and urging one and all to continue to contribute generously so that the initial target can be achieved within the shortest possible time.

(g) We continue to utilize the services of Bhutan Foundation (New York), International Bhutan Foundation(Geneva), American Himalayan Foundation, Friendship Associations, Consulate Offices and Bhutanese Missions abroad.

(h) Fund is invested in short term/fixed deposits, Druk Air Bond, etc.

(i) Attention is being given to investment of the Fund as it plays a critical role in the progress of the Fund.

(j) Preparation of Move for Health & Happiness (Second Walk) is being initiated.

VACCINE WASTAGE AND COLD CHAIN MAINTENANCE

An assessment report

Vaccine Preventabel Disease Program
Department of Public Health
Ministry of Health
Thimphu, Bhutan
2007

VACCINE WASTAGE AND COLD CHAIN MAINTENANCE

Addressing Challenges in Bhutan

UNICEF, REGIONAL OFFICE FOR SOUTH-ASIA ROSA)

Prepared by:

Dr. K. Suresh, MD, DIH, D.F, FIAP, FIPHA, FISCD

EPIDEMILOGIST & PUBLIC (CHILD) HEALTH CONSULTANT

15 June - 27 July 2007

I. Preface

Immunization is one of the most cost effective interventions for disease prevention. Traditionally, the major thrust of immunization services has been reduction of infant and child mortality. However, newer vaccines like Hepatitis B vaccine administered in infancy, gives life long protection against liver cancer and other complications of Hepatitis B infection in adults. Immunization delivery is also a vehicle for health promotion and other health services addressing morbidity of public health significance in all age groups. Immunization is thus not simply an item of national expenditure but truly one of national investment.

The World Health Organization reports over 50% Vaccine wastage around the world. Increasing EPI vaccine costs during last 2-3 years, tightening vaccine securities and introduction of the new and under utilized vaccines through the Global Alliance for Vaccine Immunizations (GAVI) are mobilizing countries to look more than before at vaccine wastage. GAVI has also requested countries to bring down the vaccine wastage. The countries should aim at a maximum wastage of 25% in first year and subsequently reduce to 15%.by the third year for each vaccine. For the single and 2-dose vial size vaccine the maximum permissible wastage is 5%.

GAVI has given conditional approval for introduction of Hib vaccine in the country. A technical review of the progress made by the EPI in Bhutan is requested to provide additional information on specific activities and changes in program design and cold chain to meet the additional storage capacity (if required) and to minimize the vaccine wastage and enhance the impact.

An Implementation Support Mission of JICA in 2005 noted significant vaccine wastage at the central and regional stores particularly due to poor stock control and expiry date. The Ministry of Health, Bhutan has acknowledged that the vaccine wastage is excessive in the country and has indicated the intention to reduce the same.

II. Abbreviations

ADS	Auto-disable syringes
ANM	Auxillary Nurse Midwife
ARV	Anti-Rabies vaccine
BCG	Bacillus Calmette Guerin (Freeze dried vaccine)
BHU	Basic Health Unit (with No doctor)
BHU- I	Basic Health Unit –Grade-I (with a Medical officer)
BHW	Basic Health Worker
CC	Cold Chain
CCE	Cold chain equipment
CCEM	Cold chain equipment Maintenance
CCM	Cold Chain Maintenance
CES	Coverage evaluation Survey
CMR	Child mortality Ratio
CRS	Congenital Rubella Syndrome
DF	Deep Freezer
DGHS	Director General of Health Services
DHO	District Health Officer
DMS	Department of Medical Services
DMO	District Medical Officer
DMP	Depot Methyl Provera injection
DoPH	Department of Public Health
DPT	Diphtheria, Pertussis & Tetanus Vaccine
DR	Domestic Refrigerator
Dr.	Doctor of Medicine
DT	Diphtheria & Tetanus Toxoid
DVED	Drugs, Vaccine and Equipment Division
EDL	Essential Drug List
EEFO	Early Expiry First Out
EILRCDF	Electrolux- Ice-Lined refrigerator Cum Deep Freezer
EPI	Expanded Program for Immunization
FIFO	First In- First Out
GAVI	Global Alliance for vaccines and Immunization

HA	Health Assistant
Hep.B	Hepatitis B Vaccine
Hib	Haemophillus Influenza-B vaccine
HIV	Human Immunodeficiency Virus
ILR	Ice Lined Refrigerator
IMR	Infant Mortality Rate
IP	Ice packs
JICA	Japanese Assistance for International Cooperation
MCV	Measles containing vaccine
MDG	Millennium Development Goals
MDVP	Multi-Dose Vial Policy
MIS	Management Information System
MMR	Maternal Mortality Ratio
MMRV	Measles Mumps and Rubella Vaccine
MoH	Ministry of Health, RGOB
MRV	Measles and Rubella vaccine
NMR	Neonatal Mortality Rate
OPV	Oral Polio Vaccine
ORC	Out Reach Clinics
OVP	Open Vial Policy
ORS	Oral Rehydration Salt/Solution
PHC	Primary Health Care
PLA	Participatory Learning for Action
RDU	Rationale drug Use
RGOB	Royal Government of Bhutan
ROSA	Regional Office for South-Asia
TOR	Terms of Reference
TSR	Thermo-Stat regulator
TT	Tetanus Toxoid
UNICEF	United Nations Children Fund
UNFPA	United Nations Population Fund
VPD	Vaccine Preventable Diseases
VVM	Vaccine Vail Monitor
VS	Vaccine Stacking
WHO	World Health Organization

III. ACKNOWLEDGEMENTS

At the outset I like to thank **UNICEF –** Regional Office for South East Asia (ROSA), in general and Ian Pett, Regional Advisor, Young Child Survival and Development and Dr Pankaj Mehta, Immunization, Health and Nutrition Specialist, UNICEF-ROSA, Kathmandu, in particular for providing me the opportunity to do this study titled "Vaccine Wastage Reduction and Cold Chain Maintenance" in BHUTAN. It allowed me to advocate to Royal Government of Bhutan for child survival interventions including Integrated Management of Neonatal and Child Illnesses (IMNCI) through their well thought of, and seriously pursued out reach clinics (ORC), apart from Cold Chain and Vaccine Wastage reduction which is already receiving high priority.

I wish to acknowledge the advocacy support of Ms Dr Gepke Hingst, Representative, Ms Vathinee Jitjatrunt (VJ) Deputy Representative and Dr Waheed, Chief Health & Nutrition. The sharing of their personal concerns, views, and experiences helped in design of the study. I am also thankful to Dr Waheed for accompanying me in the field visits during the first phase and his keen interest in photography which gave some of the visuals used in this document. My thanks are to the development partners from JAICA, UNFPA, WHO in Thimphu for their inputs in finalizing the presentation made on 26 July 2007. I like to express many thanks to all UNICEF colleagues in Thimphu for facilitating my stay and work.

I owe the successful completion of this study to Dr Ugen Dophu Director of Public Health, RGOB for his facilitation, in-puts at the beginning of the study. At the end of the study he chaired a technical session with Health officers on 25 July 2007, and guided the proceeding and helped in freezing recommendations. My appreciations also go to Ms Karma Tshering, EPI manager, and Mr Ganga Rai, Program officer, Department of Public Health, Thimphu for accompanying me to the field and facilitating the work. The study would not have been completed but for the un-stinted support of many DHOs, DMOs and health workers in 9 districts visited. Last but not the least my heartfelt thanks go to many people of Bhutan with whom I interacted during field visits.

My special thanks are due to Ms Dr Gepke Hingst and Ms Vathinee Jitjatrunt for their valuable encouragement, review and help in fine tuning the presentation on key findings and recommendations on vaccine wastage reduction and cold chain maintenance to the Royal Government of Bhutan and discussions on future course of action.

IV. Table of Contents

Section No	Contents	Page No.
I	Preface	**2**
II	Abbreviations	**3-4**
III	Acknowledgements	**5**
IV	Table of contents	**6**
V	TOR	**7**
A	Executive summary	**8-9**
B	Background	**10-11**
C	Methodology	**12**
D	Immunization program in Bhutan	**13-15**
E	Vaccine wastage	**16**
F	Factors affecting vaccine wastage	**17-27**
	1. Vaccine logistics issues	**18-24**
	2. Immunization practices issues	**24-26**
	3. Vaccines and syringes issues	**26**
	4. National policy issues	**27**
G	Tools available for vaccine wastage reduction	**28**
H	Summary recommendations	**29**
I	Action points	**30**
J	Other key observations	**31-32**
K	Debriefing meetings	**33**
L	Places Visited & People met	**34-35**
M	References	**35**

V. TERMS OF REFERNCE OF THE ASSIGNMENT

- Review the existing strategies to reduce the vaccine wastage at different health centers and recommend means and ways to improve the situation.
- Review the existing strategies for planning procurement and distribution of vaccines, recommend measures to change and adjust these strategies if necessary for enhancing efficacy and reducing costs.
- Conduct field visits to assess the health workers knowledge and practices, related to immunization (vaccine wastage, cold chain and logistics).
- Review existing strategies for planning, procurements, installation and maintenance of the cold chain equipment.
- Review the cold chain monitoring systems and record keeping systems with respect to distribution and status of equipment, spare parts, vaccines wastage at health facilities, regional cold stores and national level and recommend corrective measures.
- Assess the effectiveness and sufficiency of existing cold chain equipment in view of enhanced future demands for the cold chain system. Recommend if necessary, a plan for replacement or introduction of new technologies to improve the cold chain system.
- Based on the above review activities recommend key priority activities.

Icepacks storage in a deep freezer- dumping not stacking!!

A. EXECUTIVE SUMMARY

The legendary land of Bhutan was first settled in the 9th century by wandering migrants from the Tibet region of China. The strikingly beautiful kingdom of Bhutan called *Druk Yul* (Land of the Thunder Dragon) by its people lies in the eastern Himalayas.

This small, landlocked country, literally surrounded by mountains, is most difficult to navigate as there are few roads and no domestic (*in-country*) airlines or trains. Today its major trading partners are India and Thailand, however, much of its population still live in poverty despite high GDP in the region, with wide-spread illiteracy a major social problem. In the recent years the country has made remarkable progress in development of infrastructure like electricity, water supply, schools, health facilities, and sanitation.

Royal Government of Bhutan's recognition of central role of Immunization program in Child Survival and Development by achieving and sustaining immunization coverage over 90% for last 5 years and its continued commitment to support key personnel, human resource development, equipment and vaccines deserves all applauds.

The country, however, has experienced one of the highest burdens of vaccine wastage in the world, fuelled by factors including a sparse population, terrain, wide spread poverty levels, and problems with access to health care and immunization services. In an effort to reduce the vaccine wastage, the country introduced vaccine vial monitors on all vaccines, open-vial-policy for liquid and auto-disable syringes in 2003. The national policy of providing immunization services through out reach sessions for remote villages has improved the access to services and coverage at the cost of increased vaccine wastage. The poor stock control and cold chain monitoring have also contributed to huge wastage from both opened vials and un-opened vials.

The World Health Organization reports over 50% Vaccine wastage around the world. Increasing EPI vaccine costs during last 2-3 years, tightening vaccine securities and introduction of the new and under utilized vaccines through the Global Alliance for Vaccine Immunizations (GAVI) are mobilizing countries to look more than before at vaccine wastage. GAVI has also requested countries to bring down the vaccine wastage to a maximum wastage of 25% in first year and 15% in third year for each vaccine. For the single and 2-dose vial the maximum permissible wastage is 5%.

An Implementation Support Mission team of JICA in 2005 noted significant vaccine wastage at the central and regional stores particularly due to poor stock control and expiry date or cold chain failure.

The Ministry of Health, Bhutan has acknowledged that vaccine wastage is excessive and has indicated the intention to reduce the same.

As the GAVI review of the immunization program is due (having given conditional approval) for its support for the introduction of Hib vaccine, through supply of pentavalent vaccine cold chain, etc.. another technical review of the progress was felt needed. MOH, RGOB requested to provide additional guidance on specific activities and changes in program design and cold chain to meet the additional storage capacity (if required) and to minimize the vaccine wastage and enhance the impact.

Extensive individual consultations, observatory field visits are the essence of this study. On site visits to immunization sessions, inspection of CCE, their maintenance, vaccines and ice-packs stacking, validation of stock control mechanisms (through register & periodical reports), assessed the knowledge & skills of the handlers at all levels. Collation of vaccine use/wastage data of different vaccines by sessions, organized consultations with district health officials and development partners led to freezing of final key actions accepted by the MoH, RGOB.

S No	KEY ACTIONS	Responsibility
1	Strategic procurement & the feasibility & economics of purchasing small size vials of BCG & MR. & allocation and ensure coordination between program section and drugs, vaccines and equipments division DVED	MOH
2	Storage, transportation and Stock control	Cent. & Reg. Stores
3	Preventive maintenance, repairs of CC equip.	Technicians in Depots
4	**a) District vaccine handlers capacity building** b) BHU vaccine handlers update	MOH &FW &Tech (with external support) Technicians in Stores
5	Vaccine requirement estimation by facility	DHOs /DMOs
6	Monitoring CC & vaccine usage in districts	DHOs /DMOs

B. BACKGROUND:

Royal Government of Bhutan has set for itself the mandate to immunize all children with DPT-HepB, OPV, BCG and Measles-Rubella vaccines to complete the primary series of vaccination before the age of one year. It also has a **goal** to reduce morbidity, disability and mortality from the EPI target diseases to a level where these diseases cease to be a public health problem.

Royal Government of Bhutan's recognition of central role of Immunization in Child Survival and Development by achieving and sustaining immunization coverage over 90% and its continued commitment to support key personnel, human resource development, equipment and vaccines deserves all applauds.

The routine Immunization Program was launched in late 1970's against six VPDs. Since 2006 MR has been included in the routine immunization session to be given at 9-months and at 24 months of child's life. This was a consequence of an epidemiological investigation of an outbreak in 2003 and retrospective analysis of Hospital records of CRS cases, that led to an effective Measles and Rubella vaccination Campaign in March (16-21) 2006 to address the Congenital Rubella Syndrome.

In an effort to reduce the vaccine wastage, the country introduced vaccine vial monitors on all vaccines, open-vial-policy for liquid and auto-disable syringes in 2003. Induction of 2 dose vial of Tritanrix (DPT +Hep B) in the program and MR (2 doses/child) have also contributed to minimizing vaccine wastage.

The World Health Organization (WHO) reports over 50% Vaccine wastage around the world. Increasing EPI vaccine costs during last 2-3 years, tightening vaccine securities and introduction of the new and under utilized vaccines through the Global Alliance for Vaccine Immunizations (GAVI) has requested countries to aim at a maximum wastage of 25 % in first year and subsequently reduce to 15%, by the third year for each vaccine. For the single and 2 dose vial size vaccine the maximum permissible wastage is 5%.
Bhutan has experienced one of the highest burdens of vaccine wastage (50-95%) in the

world, fuelled by factors including a sparse population, terrain, wide spread poverty levels, and problems with access to health care and immunization services. It has traditionally been difficult to monitor vaccine wastage burden and trends in Bhutan because of the high wastage and poor stock control and cold chain maintenance infrastructure- It has been even more difficult to detect, diagnose, and control wastage until today and the problem is quite large.

Societal Response:

The Ministry of Health has acknowledged that vaccine wastage is excessive and has indicated the intention to reduce the same. In this direction MoH has introduced MDVP in institutions with some success, but it's policy of providing vaccination services in all Out Reach Clinics (ORC) is contributing to out of proportion vaccine wastage. The Ministry has also signalled the intention to introduce principles of sustainability and cost-effectiveness, and to improve health information systems with support from several international organizations, including UNICEF, UNFPA, JICA and the World Health Organization. The MoH's capacity to govern, regulate vaccine stock control and cold chain system, collect and analyze data for right decision making needs strengthening.

Justification for this Assessment:

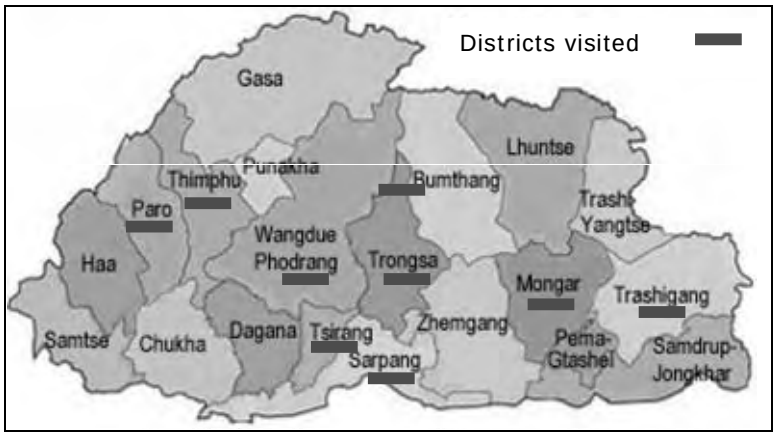
An Implementation Support Mission team of JICA in 2005 noted significant vaccine wastage at the central and regional stores particularly due to poor stock control and expiry date or cold chain failure. As the GAVI review of the immunization program is due (having given conditional approval) for its support for the introduction of Hib vaccine, through supply of pentavalent vaccine another technical review of the progress made by the program was requested to provide additional guidance on specific activities and changes in program design and cold chain to meet the additional storage capacity (if required) to minimize the vaccine wastage and enhance the impact.

C. METHODOLOGY:

The entire mission was conducted in 2 phases. In the first phase the active members of the mission apart form the consultant were Dr Waheed, Project Officer-Health, UNICEF Thimphu and Ms Karma Tshering National EPI Manager, Bhutan. In the second phase Mr Ganaga Rai Program Manager MOH, Bhutan accompanied the consultant. The second phase was more challenging due to terrain, distances covered and rains, land slide and road blocks.

The mission in Thimphu reviewed immunization project documents national and international (WHO/ UNICEF) guidelines, Annual Reports and vaccine procurement process and logistics. Consultations were held with DGHS, EPI Manger, MIS officer, Central Medical and Regional Store Depot managers and development partners to understand concern of vaccine wastage. Nine Dzongkhag's (districts) were visited in all, namely (Phase-I) Thimphu, Wangdue Phodrang, Paro, Sarpang, Tsirang, and (Phase-II) Mongar, Bhumthnag Trashigang and Trongsa)

BHUTAN MAP - DISTRICTS VISITED



Source: Planning Commission of Bhutan's website

The key tasks performed were:

- Discussions with DHO's, DMO's, HAs, BHW and ANM.
- Immunization sessions observations at District, BHU and ORC.
- Inspection of CC equipment, their maintenance, vaccines and ice-packs stacking.
- Validated stock control through register & periodical reports
- Assessment of knowledge & skills of the handlers at Vaccine stores & other levels.
- Observed Hospital waste disposal particularly syringes and sharps.
  - Collation of vaccine use /wastage data for **Last One Month** and last 6-12 months
  - Assessment of use of different vaccines by sessions

D. IMMUNIZATION PROGRAM IN BHUTAN:

As in any developing country, Immunization program in Bhutan aims at protection of children born every year against vaccine preventable diseases. It has strategized immunization access through out the country so that every child born is fully protected by the first birth day. The capacity of the personnel entrusted to deliver immunization services is developed through appropriate training and periodical updates. Informed and skilled health provider notifies fixed day contacts and ensures services on the fixed day. Bhutan country's Immunization Schedule Based on prompt data analysis.

BHUTAN NATIONAL IMMUNIZATION SCHEDULE- CHILDREN			
Vaccines	**Schedule and age of vaccination**	**Dose**	**Site or route**
BCG	At birth or first contact	0.05 ml	Intradermal, Right upper arm
OPV	At birth (within 0-14 days considered as 0 Dose) OPV1 at 6 weeks, OPV2 at 10 weeks, OPV3 at 14 weeks	2 drops	Oral
MR	MR1after completion of 9 months; MR2 at 24 months	0.5ml	Subcutaneous, left upper arm
DTP-HepB	DTP-HepB1 at 6 weeks, DTP-HepB2 at 10 week DTP-HepB3 at 14 weeks	0.5 ml	Intramuscular, antero-lateral aspect of mid thigh
DT	Booster dose at 24 months	0.5 ml	Intramuscular, antero-lateral aspect of mid thigh

BHUTAN NATIONAL IMMUNIZATION SCHEDULE- PREGNANT WOMEN			
Antigen	**Schedule and age of vaccination**	**Dose**	**Site or route**
TT1	1st contact during pregnancy	0.5 m	Intramuscular
TT2	At least after 4 weeks of TT1 during the same pregnancy	0.5 ml	Intramuscular
TT3-TT5	One each in subsequent pregnancies, maximum of 5 doses	0.5 ml	Intramuscular

A network of 29 Hospitals, 176 BHUs and 514 out-reach camps (ORC) provide immunization services. The referral hospitals provide immunization on all working days, while the district hospitals provide immunization once or twice a week. The BHU hold immunization sessions once or twice a month in the facility and also provide immunizations in (3-4/ month). if eligible children are there in out reach clinics apart from providing other health cares like ANC, PNC, family planning and health education.

The CCE in the program include, one walk in cooler at the central cold store, ILR, DF, 20 liter cold boxes at the central and regional stores and a refrigerated van at each regional cold stores for vaccine transportation. All hospitals are provided with domestic refrigerator,

ILR (Electrolux ice lined refrigerator-cum-deep freezer), DF, cold box and vaccine carriers. All BHU have refrigerator (electric/ kerosene/dual operated), cold box and Vaccine carriers.

The vaccines used in Bhutan are, OPV, MR, TT, DT (10 dose), BCG (20 dose) and DTP-HEPB (2 dose) vials. The country also uses anti-rabies vaccine (ARV), anti-snake venoms (ASV) and anti-diphtheria serum (ADS) for post exposure protections.

All the health facilities and ORCs use auto-disable syringes (ADs) for immunization and safety boxes to discard the used syringes. Immunization cards and registers are maintained well. The recording on immunization cards of vaccines provided with date is generally entered immediately. However the entries in registers capture days vaccination only and therefore do not help in arriving at the number of fully vaccinated children

To achieve the goal set, the country is pursuing following strategies:

- Increasing the immunization coverage (more than 95%) and sustaining the coverage level and the quality of immunization services.
- Continued advocacy, social mobilization and program communication.

- Vaccine logistics and cold chain system management.
- Monitoring and integrated surveillance of vaccine preventable diseases.
- Strengthened technical capacity and resources for the VPDP.
- Introduction of appropriate new vaccines and technology.
- Integrated disease surveillance (along with the general morbidity and mortality) at the BHU and district and referral hospitals
- Partnership with international and national agencies for resources mobilization and technical support.
- Capacity building of community health workers and village volunteers.

As Surveillance of target diseases is the tool and test for program's success in achieving the goal of eliminating or eradicating the VPD, the country has established an weekly AFP surveillance and rest of the vaccine preventable diseases surveillance is integrated in all hospitals and BHU's is with general morbidity and mortality data collection monthly.

For the program management there is only handful of dedicated staff. The national EPI manager is supported by 6 technicians, who are placed in the divisional stores (@ 2 per store). The EPI monitoring at BHU and district hospitals is expected to be done by DHO's and DMO's respectively. This is a weak link as these officers hardly monitor the EPI.

However Bhutan has long experienced one of the highest burdens of vaccine wastage in the world, fuelled by factors including a sparse population, Terrain, high poverty levels, and problems with access to health care and immunization services. It has traditionally been difficult to monitor vaccine wastage burden and trends in Bhutan because of the high wastage and poor stock control and cold chain maintenance infrastructure. It has been even more difficult to detect, diagnose, and control wastage until today and the problem is quite large. Therefore the vaccine wastage rates used for different vaccine are in the range of 60-90%, drawing the attention of development partners to the extent there are serious consideration to with draw the financial support being provided over last 10-15 years.

Collating & analyzing information on eligible children for each session, improving the utilization rates of MDVP vaccines in facilities and rationalizing use of multi-dose presentations of single dose freeze dried and /or liquid vaccines at smaller sessions (BHU/ ORC) are the possible options for vaccine reduction.

E. VACCINE WASTAGE:

Vaccine usage is defined as the proportion of vaccine that is administered and it is calculated using the formula:

$$\textbf{Vaccine Usage (rate)} = \frac{\text{No of doses administered}}{\text{No of doses issued (OB+ Receipt- CB)}} \times 100$$

Based on the vaccine usage rate the **Vaccine Wastage** (rate) is = 100-Vaccine usage rate

TYPES OF VACCINE WASTAGE:

Globally vaccine wastage is differentiated in two types:
1. Wastage of unopened vials and
2. Wastage from opened vials.

The wastage in unopened vials happens mainly due to expiry, hjeat Stress, VVM- indication, freezing, breakage, theft, discarding unused vial after returning from an out reach session. The vaccine wastage from opened vials is mainly attributable to discarding remaining doses at the end of a session, poor reconstitution, unable to draw the specified no of doses, suspected contamination, opened vials submerged in water & child's reaction requiring more than 1 dose.

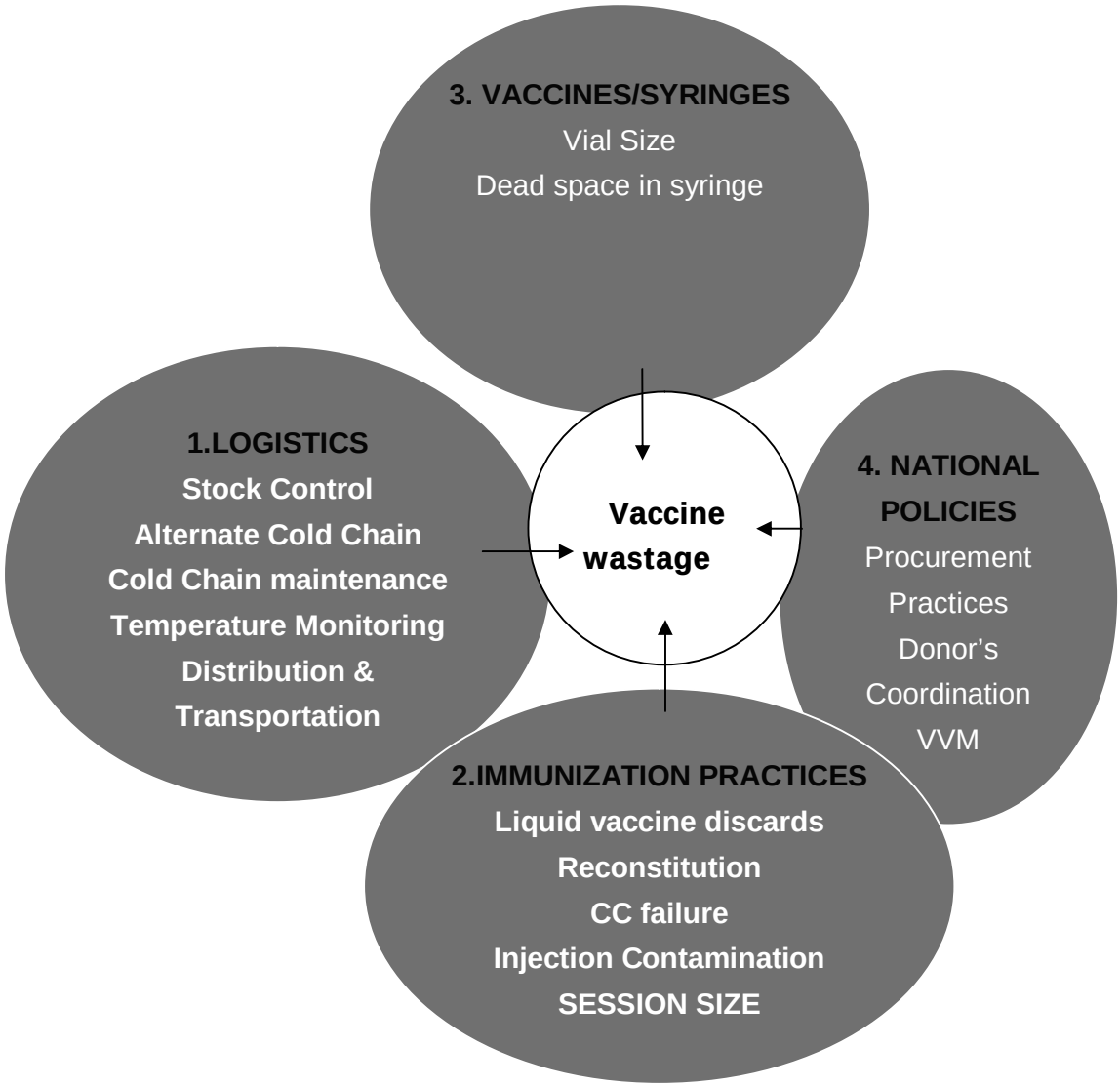
In Bhutan Immunization coverage has increased and remained at high level of 90% plus over 5 years. Vaccine wastage has increased over the same period especially after the introduction of national policy of providing immunization in all ORCs to increase accessibility. The Program had enough vaccines to replace these losses. Therefore most wastage is expected in unopened vials, though discards may involve both opened and un-opened vials. This calls for vaccine forecasting review which was done to assess if more than required is ordered & received.

It is inferred that in the context of Bhutan the factors underlined are the main reasons for wastage in both the categories.

F. FINDINGS, INFERENCES AND RECOMMENDATIONS

A. Factors Affecting Vaccine Wastage:

The following paragraphs highlight the factors affecting vaccine wastage by the key contributors, the inference drawn and recommendations proposed. The key factors are generally described under four major headings, as shown in the figure.



1. Vaccine Logistics:

1.1: Vaccine Forecasting:

The summary observations in the vaccine logistics across the country were, vaccines forecasting (estimates) is ritually done at MOH using WHO/UNICEF Guidelines and local wastage rates based on the vaccine supplied to user end and their reported performance. For the year 2008 the estimations are shown in the table:

FORECAST OF VACCINE FOR 2008-BHUTAN						
Vaccine	Target population	Estimated coverage 07	Estimated wastage	Total doses	Buffer stock	Total estimates
BCG	15,025	98	75	58,898	14,500	73,398
MR		95	60	71,369		71,369
OPV		98	25	78,531		78,531
DP+Hep B		97	55	97,162		97,162
TT		65	60	48,831	6,500	55,331
DT		92	60	34,558		34,558

Major observations are: 1) the target population is over-estimated by 8-10% 2) The carry- --over balance of all vaccines is assumed to be zero. The actual wastage (inclusive of buffer stock) works out to be much higher for estimated 14,000 beneficiaries. There is very little relationship between estimates and the quantity procured. The other facts include a) vaccines bought for supplementary and routine immunization and vaccines from multiple sources are not coordinated, c) The Stock Control at the central, regional and even district level is poor. Moreover, supplies from central and regional stores are erratic d) Short expiry vaccines are pushed down the line resulting in wastage. OPV, BCG, Measles and MR vaccines have met this fate in the recent years, e. g, BCG in Jan (3278 x 20) & March (1886 x20) vials 06, Measles in march 2005 (3860 x10) & MR (618x10) in June 06 and again (6000x10) vials in June 07. Polio (1845 x10) in April 05 & (1577x10) in June 05.

Therefore it is recommended that annual requirement of vaccines by each district /Units within districts be estimated based on sessions and the number of times each vaccine is used. Vaccine distributing agency be entrusted the responsibility to monitor supplies against the coverage with due authority.

This brings us to debate on the process of vaccine estimation. Traditionally this is done based on estimated survivors, expected coverage and permissible wastage. If this method is used for Bhutan immunization strategies the vaccine estimates would be inadequate and may last for hardly 5-6 months.

On the other hand the luxurious approach would be to estimate based on the assumption that at least one vial of each vaccine (some times more especially of vaccine required to be given in multiple doses per child, namely Polio, TT, DT and DPT and Hep. B (+ Hib) is required for each session). However this study observed that in very few sessions (like, Thimphu hospital) each vaccine is given. In the ORC, BHU and some times even in district MCH clinics it is observed that hardly one third to half of the sessions provide BCG and MR vaccine for want of beneficiaries.

The annexed excel tables indicate the proportion of sessions by facility providing each vaccine, the same is summarized as follows:

PROPORTION OF SESSIONS PROVIDING INDIVIDUAL ANTIGENS							
Facility type & their number	Planned Sessions per month	Sessions Held LM	No of sessions providing individual vaccine				
			BCG	MR	OPV/ Triatanrix	TT	DT
Dist. MCH Clinic (9)	85	80	66	79	81	75	58
Dist ORCs (9)	46	42	21	28	34	29	20
BHU +ORC (14)	61	53	25	33	48	34	25
Total (32)	192	175 (91)	112 (64)	140 (80)	163 (93)	138 (80)	103 (59)
Value in parenthesis indicates percentage							

It can be observed that over all BCG is provided in two out of three times (64% - half the times or even less often in ORC & BHUs and around three out of 4 times even in district hospital sessions), MR in 80% of sessions. This trend is reversed for TT and DT respectively. This helps the need to reduce the supply accordingly. We also have to consider the contribution of coverage by different strategies (hospital and BHU clinics & ORC).

Based on a months review the proportion of contribution of different approaches to coverage is as follows:

PROPORTION OF CONTRIBUTION TO COVERAGE BY SERVICE TYPE (SAMPLE DATA)						
Service type	BCG	MR	OPV	DPT+ Hep.B	TT	DT
R &D Hospitals-9	83.82	83.12	72.4	70.1	84	62
Hospitals ORCs -- 36	4.244	9.494	7.33	7.87	1.1	3.24
BHU Clinics-13	4.509	5.485	6.62	7.02	3.3	6.3
BHU ORCs-47	7.427	21.1	13.7	15	12	28.4

The sample facilities visited showed the contribution as indicated in the table above. The estimates based on this sample, the number of each category institution estimated to contribute are shown below. One can see that the Hospitals and their ORCs contribute to 70% of BCG, 65% of TT and around 55% of OPV/ Tritanrix and MR and only 40% of DT. Rural set ups like The BHU and their ORCs contribute to 30% of BCG, 45% of OPV/ Tritanrix and MR and 60% of DT. The practical approach uses both the above factors (contribution by different service types and the proportion of sessions providing individual vaccine) in calculating vaccine estimates.

PROPORTION OF CONTRIBUTION TO COVERAGE BY SERVICE TYPE						
Service type	BCG	MR	OPV	DPT+ Hep.B	TT	DT
R &D Hospitals- 29	65.62	47.86	49.7	47	64	37.2
Hospitals ORCs -120	4.419	7.27	6.7	7.03	1.1	2.58
BHU clinics -176	14.83	13.27	19.1	19.8	11	15.9
BHU ORCs- 514	15.13	31.6	24.4	26.2	24	44.4

Therefore it is recommended that the vaccine estimate be calculated based on this practical approach. At the national level the vaccines can be forecasted by using these proportions or collating the district estimates and the district micro-plan based on 3 months (best, medium & low) performance in 2006.

The table below compares the vaccine estimates based on these three-approaches for Bhutan

COMPARATIVE VACCINE ESTIMATES (FIGURES IN VIALS)			
Vaccine	Population based	Session based	Field reality Based
BCG	1306	11734	5296
OPV	8355	17601	10252
MR	2612	11734	5296
Tritanrix	21045	18670	26568
TT	2852	20468	9624
DT	2557	11734	7386

1.2 Stock Control:

A good stock control mechanism involves recording of the date of expiry, VVM status, and monitoring the temperature of the equipment in which the vaccine is stored at different levels till it is given to the beneficiaries. Safe temperature during transportation from one level to another is also important. It also demands that the vaccine issuer knows the periodical requirements of the indenter. They should also compare the performance against the vaccine used and then replenish only the quantity used during the previous reporting period (excluding buffer stock).

It was observed that in Bhutan central, divisional and district stores this stock control mechanism is not practiced. The lack of monitoring expiry date has led to the vaccine wastage year after year. Though incidence of cold chain failures is rare, the freezing of the vaccines (not noticed during this mission) may not be uncommon during winter. The vaccine is issued to the sub offices/units as per their demand and there is no one who monitors the use against the vaccinations done. The stores are mainly doing courier services with no authority or responsibility for stock control.

1.3 Cold Chain System and Alternative Arrangements:

The cold chain system was studied at four levels and the situation is as following:

a) CENTRAL STORES AT THIMPHU

It is under the control of a joint director who is supported by 2 technicians from the EPI section, MOH. The technicians are the sole managers in practice and the

involvement of persons other than technicians was not visible. There is the only Walk in Cooler of the country in central stores, which did not have automatic shifting facility to generator in case of electricity failure. Only 15-20% capacity was used for vaccines, rest space was used for HIV kits, ARV and chemicals. Most of the vaccines were ('T'-series) stored in Ice Lined Refrigerators (ILR) and OPV and Ice Packs (IP) in Deep Freezers (DF).

Multiple registers (5-6 sets in last 3-4 years) make the task of reviewing the receipts, issues and discarding of vaccines due to wastage very difficult. Lack of monitoring the date of expiry has lead to discarding of large quantity of vaccines, e.g, BCG in Jan (3278 x 20) & March (1886 x20) vials 06, MR in March 2005 (3860 x10) & (618x10) in June 06 and again (6000x10) vials in June 07. Polio (1845 x10) in April 05 & (1577x10) in June 05 which is not taken seriously instead pushing short expiry vaccines down the pipe line is resorted to.

b) REGIONAL STORES (GELEPHUE & MONGAR)

Regional stores stock vaccines in ILRs & DFs, which they have in adequate numbers. As a result only 50% of capacity was in use during our visit. The regional stores do have electricity back-up but generators need to be operated manually. Two technicians of EPI-MOH manage the stores. They have no CC preventive maintenance plan but do attend repairs only on call. All of them have been trained in minor repairs and CCM. They have good skills and experience but are used as distribution agents only. They can contribute more to CCM and stock control.

Temperature charts are maintained casually (+2 or - 18-20) showing little fluctuation and no noting of electricity failure. The stores do not have district or unit-wise requirements of vaccines. They don't get performance reports to control vaccine use.

Recommendations: It opined that there is no need of supply for new or replenishment CC equipment. Cold chain preventive maintenance plan and its meticulous implementation, unit-wise vaccine requirement ready reckoner, authority to control use and responsibility for periodical user's training would go a long way in improving CCM.

c) COMMUNITY HEALTH (MCH) CENTRES OF DISTRICT HOSPITALS:

Most of them (except those at reg. stores Hqs.) have the responsibility of vaccine

distribution to BHUs in the district in addition to issuing to their clinics and ORCs. Mostly the vaccines are stored in domestic refrigerators and Ice-packs in deep freezers. Electrolux ILR/DF is generally used as deep freezer and very few know how to convert it as ILRs. The Vaccine handlers have low understanding of logistics or CC equipment and have no authority to check the Vaccine use. Freezing of vaccines was not witnessed in these visits. The mission opines that these units are the weakest link in vaccine logistics in the country.

Recommendations: Use of Electrolux units as ILR, authority to control vaccine use, training the vaccine handlers in cold chain equipment maintenance (CCEM) & vaccine logistics (VL) is need of the time.

d) COLD CHAIN AND VACCINE LOGISTICS IN BHU'S

Most of the BHU's have dual (Electrical/Kerosene) operational domestic refrigerator. Some 20% of the facilities do not have electricity and hence run the equipment on Kerosene. The workers know how to change the equipment to kerosene operation. During our visit we witnessed one BHU did not convert to kerosene operation for want of funds. This had lead to compromises (as vaccines were stored in thermo cool boxes).

Freezing of vaccines was not seen in these visits. Temperature charts were maintained but did not reflect the real change over days or times. Vaccines and ice-packs were generally stacked well. Discarding of un-opened vials of vaccine if the return from the ORC on the day was not possible appeared to be common practice and is leading to unnecessary wastage.

Recommendations: Vaccine user's training (by regional technicians) to update discard criteria, monitoring the thermostat performance and realistic temperature maintenance.

1.4 Temperature & VVM Monitoring:

The country's policy of procuring all the Vaccines with VVM is commendable. However the practice of using the VVM status as the only criteria to discard vaccine is not yet fully established. Temperature were recorded casually every where. They hardly indicated any fluctuation / electricity cuts over the days or short scheduled cuts even within a day. VVM's

use in discarding the unopened vials is wanted as at least 5 workers reported discarding vaccine due to heat stress despite VVM being OK as they were not able to return the vials to the refrigerator the same day. No freezing of vaccine was seen or heard.

Recommendations: Oversight and monitoring by DHO's of factual temperature recordings and reemphasizing the use of change in VVM as the sole criteria in deciding discarding of unopened vials especially from ORCs.

1.5 Distribution & Transportation of Vaccines:

The central store in Thimphu receives vaccines from Paro airport on intimation from the suppliers in refrigerated trucks. Vaccine supply to districts and regional stores is based on the district indents only. Transportation to the district is doe through Vaccine Delivery Vans - replacement of ice on the way, not done or reported even though travel may take more than 8 hours. The distribution of vaccine for the use based on early expiry first out (EEFO) instead of first in first out (FIFO) is the key to minimize vaccine wastage at all levels. The only criteria getting priority over this principal is that of VVM colour change. There were incidences noted where in the EEFO rule was not thought, instead FIFO was followed.

Recommendations: Better stock control, transportation following strict cold-chain. Replenishment of quantity used in the previous supply period (+1 month's requirement as buffer stock)

2. Immunization Practice Issues:

2.1 Liquid Vaccines Discard:

Open vial policy for the liquid Vaccines in hospitals & BHUs is in vogue since 2003.

MDVP – USAGE RATES				
Facility	**OPV**	**Tritanrix**	**TT**	**DT**
Hosp	**63** (38-90)	**88** (68-100)	**30** (53-94)	**50** (10-85)
MCH ORC	**44** (30-75)	**60** (75-83)	**18** (20-50)	**14** (10-50)
BHU	**57** (20-80)	**85** (50-100)	**47** (20-75)	**61** (20-100)
ORC	**40** (14-85)	**74** (50-100)	**52** (10-90)	**39** (20-70)
BHU- 6 Months	**46** (16-70)	**84** (55-96)	**71** (20-96)	**38** (16-89)
Figures in parenthesis reflect ranges				

However the monthly vaccine usage report (completed doses) does not reflect the same. Opened vials in ORCs are to be discarded even if one dose is used. Usage rates reflect differences among sessions. Discarding unopened vials from the ORCs were reported especially when they do not return the same day (fearing heat stress despite VVM being OK). The data (table-4) for last one month in different facilities show that even in hospital and BHU sessions the usage rates are only in the range of 30-63% for 10 dose vials and around 85-88% for 2 dose vials as against expected rates of 95% despite MDVP be invogue for 3 years.

2.2 Reconstitution:

Reconstitution of BCG & MR is done well and reconstituted vials are invariably discarded at the end of each session. This issue is not of concern for vaccine wastage in Bhutan.

2.3 Cold Chain Failure:

Thanks to good electricity supply (& kerosene run option refrigerators) at BHU no cold chain failure is reported. Only one instance of shifting the vaccines to a thermo–cool box noted (despite a 5 litres cold-box being there) due lack of funds to switch to the kerosene operation. Freezing of vaccines not seen but can not be ruled out in winter. Defrosting of refrigerator was need only in 2 out of about 50 odd units seen.

Recommendations: Provision of funds for kerosene even in facilities with electricity and practice of temporary shifting of_vaccines to a cold-box only during electricity failure be re-emphasized.

2.4 Injection Contamination:

Injection contamination is neither observed nor reported. Practice of MDVP in BHUs and MCH clinics have not faced any contamination problem. Anecdotal example of use of TT/DT/ Tritanrix opened vial vaccines from the ORC (and vice versa) has also not posed any injection contamination problem.

The anecdotal examples may open an opportunity to take up an operation research to formalize MDVP between clinic & ORC. If successful it would save vaccines and money.

2.5 Session Size:

Small session size increases the vaccine wastage especially if the large size vials are

supplied. However the challenge is that the immunization coverage is not compromised. Therefore, the minimizing of vaccine wastage in fixed sessions and ORC need to be approached differently. The table below shows the average number of children vaccinated with different vaccines.

AVERAGE CLIENTELE BY SESSION				
Sessions	BCG	OPV/TRI	MR	TT/DT
MCH clinic	4	13	5	16/4.5
MCH ORC	0.5	3.5	1.5	0.6/0.6
BHU Clinic	1	5	1.1	3/2
ORCs	0.6	4	2	4/1.5

In the context of Bhutan MCH clinics may offer BCG / MR once or twice a week. Similarly - BHUs do not justify more than one session per month. ORCs in majority of cases reconstitute BCG/ MR only when there is a child, which may be once in 2-4 months. Tracking expected date of deliveries of pregnant women and/or births in the area may be a good practice in deciding to carry the single dose large sized vaccine vials to ORCs.

3. Vaccine & Syringes Issues:

3.1 Vaccines:

As expected wastage is highest for BCG (92%), followed by MR (70), DT (60) OPV (56). Small size vials may reduce vaccine wastage as evidenced by the DPT + Hep-B 2 dose vial procurement but not necessarily cost per child vaccinated. One can explore the feasibility and economics of purchasing small sized vial of BCG & MR. The GAVI support for single dose Pentavalent vaccine may be seen as a boon.

The CC storage space required to accommodate extra volume due to procurement of single dose vials of pentavalent vaccine (DPT + Hep-B + Hib) at all levels (except at districts) is adequate. The district level stores can, however, manage the extra volume if the existing west frost ILRCDF are retooled as ILRs and used judiciously.

3.2 Dead space in Syringes:

Bhutan uses auto disable syringes in EPI, therefore the dead space (50 micro-litres for 0.5

ml and 25 ml.) in syringes is not an issue, as the vaccine manufacturers do overfill to compensate for vaccine wastage attributable to this dead space (insist in purchase orders).

4. National Policy Issues:

The national policy issues related to vaccine wastage are procurement practices (processes), immunization strategies introduction of VVMs and donor coordination.

4.1 National Policy (immunization strategies):

The national policies of a) opening a vial even if there is one child is available in a session b) out reach approach to make the access of immunization universal and c) Multi-dose Vial Policy are highly appreciable. While the first two put pressure on vaccine wastage the third one counters them to certain extent.

4.2 National Policy (procurement processes):

Among the three pocurement processes related issues namely forecasting, choice of vial size and insufficient cold chain capacities the first two are contributing to the vaccine wastage in Bhutan. Poor forecasting is leading to more vaccine procurement than needed are leading to vaccine wastage due to expiry. The choice of BCG and MR vials is also contributing to wastage of these vaccines. Non coordination between the vaccines bought for supplementary (camps) and routine immunization and also lack of coordination among partner agencies are factors affecting the wastage as highlighted in the earlier paragraphs. There is also the issue of better coordination between program section and Drugs Vaccine and Equipment Division (DVED). Use of software for vaccine stock control would also help.

4.3 Introduction of VVMs:

The country has introduced VVM since 2003 and in 2007 all vaccines had VVMs. However health workers are still not comfortable in deciding on the issue of discarding vaccine vials (especially those taken to ORC and not returned on the same day) based on VVM. This might need reiterating existing guidelines and on job support.

Recommendations: Ensuring good practices of Strategic Procurement Processes (forecasting, storage and distribution, keeping tab on the stock at central /regional stores. Taking into consideration the quantity of vaccine in the pipe-line at the beginning of each year and practical way of assessing the vaccine requirements by individual units are important practices. Timely distribution of

vaccines with adequate expiry time for the user and maintaining strict cold chain during transportation are also equally important.

G. TOOLS AVAILABLE FOR VACCINE WASTAGE REDUCTION:

Considering all the existing national policies, immunization practices, vaccine logistics some key tools or ways have been identified for vaccine wastage reduction in Bhutan and summarized in the following table.

The items listed on the left side of the table namely: Improved Practices of Vaccine Procurement and Vaccine Management, re-emphasizing MDVP and monitoring its implementation fully in hospitals and enforcing EEFO policy implementation (not FIFO) for vaccine issue would yield immediate results. Optimizing Immunization Session frequency with Session & Vial Size, Changing the Vial Size if economically feasible and ensuring better coordination among program section and DVED and development partners are other measures suggested to be taken for achieving long term optimal vaccine wastage reduction.

TOOLS AVAILABLE For VACCCINE WASTAGE REDUCTION	
MOST RELEVNAT FOR BHUTAN	Completing the list
Improved Practices: **a) Vaccine Procurement** **b) Vaccine Management Practices**	Prevention of Vaccine vial submergence in water
EEFO vs FIFO	VVM
Donor coordination	Prevention of Freezing
Optimizing Immunization Session Frequency with Session & Vial Size	Safe Immunization Practices
Multi-Dose Vial Policy (MDVP)	
Changing the Vial Size	

Issues shown on the right side of the table are just for the completion of all possible reasons for vaccine wastage and are not of much relevance for Bhutan at his point of time

Role of development Partners:

The development partners should coordinate in resource mobilization for supply of CCE and vaccines and providing technical support for in-country capacity building for their use and maintenance. Sharing of information generated by studies/reviews instituted go a long way.

H. Summary Recommendations:

- The vaccine requirement should be estimated based on practical approach. At the national level vaccines can be forecasted by the proportions suggested by the consultant or collating the district estimates.
- Vaccine distributing agency should be entrusted with due authority and responsibility to monitor and replenish the used vaccine quantity.
- CC preventive maintenance plan and its meticulous implementation, use of unit-wise vaccine requirement ready reckoner, periodical training of staff would go a long way in improving CCM.
- There is no immediate need of CCE supply.
- At district level there is an urgent need for use of Electrolux units as ILR, with due training to the vaccine handlers in CCEM & VL.

- Oversight by DHO's of factual temperature monitoring and reemphasizing the use of change in VVM colour as the sole criteria in deciding discarding of unopened vials.
- Ensuring good practices of Strategic Procurement Processes (forecasting, storage and distribution), keeping tab on the stock at central/regional stores. Distribution of vaccines with long expiry and maintaining cold chain during transportation.
- Encouraging and monitoring better utilization of MDVP in facilities to compensate more wastage in ORCs.
- Ensuring use of EEFO policy by all field workers especially for unopened vials.
- Optimizing Immunization Session frequency with Session & Vial Size.
- Changing the Vial Size of BCG and MR vaccines, if economically feasible.
- Ensuring better coordination among Donors and program section and DVED.

I. Action Points:

The mission suggests a few priority actions specifying agencies to take responsibilities.

1) The MoH may have to lead by example in enforcing the strategic procurement processes and coordination between program section and DVED. It may also have to consider options for policy changes related to vaccines included (particularly BCG as referred by the DGHS in the debriefing meeting) in the national immunization schedule and periodicity of providing vaccines like BCG / MR. It may also consider the operational research of expansion of MDVP policy between fixed clinics and ORCs.

2) The EPI section has to ensure immediate training of district level vaccine handlers. It should also enforce vaccine stock control and preparation and execution of a CC preventive maintenance plan.

3) The district Health officers and DMO should get done micro-planning of vaccine estimation based on the field realities in their respective districts. They should also take seriously the task of monitoring temperature records, vaccine use and discarding.

These suggestions were agreed in principle during the final debriefing meeting on 26 July 2007. The chairperson assured that the actions will be initiated after internal discussions.

SUMMARY ACTION POINTS	
Action	**Responsibility**
Strategic procurement & the feasibility & economics of purchasing small size vials of BCG & MR. & allocation and ensure coordination between program section and DVED	MOH
Storage, transportation and Stock control	Cent. & Reg. Stores
Preventive maintenance, repairs of CC equip.	Technicians in Depot
1. **District vaccine handlers Capacity building** 2. BHU vaccine handlers update	MOH &Technicians (with external support) Technicians in Stores
Vaccine requirement estimation by facility	DHOs /DMOs
Monitoring CC & vaccine usage in districts	DHOs /DMOs
Operation Research of MDVP between clinic & ORC. Consider policy of BCG/MR offered 4/year in ORCs. Increase frequency of ORC for better sickness & RH care i.e. MNCI	MOH

J. OTHER KEY ISSUES:

Through out the entire mission the consultant was keenly observing and exploring the status of the other maternal care and child survival issues. I would like to highlight a few interesting and useful issues for Royal Government of Bhutan and Development partners especially UNICEF.

Household Survey:

The Royal Government of Bhutan gets enumerated all the households in the country during April/May every year. Apart from demographic data, housing structures, water and sanitation facilities and their use, transport and communication and use of the health services is collated.

Unfortunately the data collation and country report takes almost a year at national level and immediate use of the data is hardly made use. If the district level / local analysis of this is encouraged, the information could be used for micro level program / interventions planning. One immediate use for the vaccine wastage is the data on births by months by villages. This can be used in planning ORCs and taking high wastage vaccines like BCG / MR to the ORC.

Out Reach Clinics:

The out reach camps are contributing a lot in taking all health services to remote rural population. They provide sickness care, birth spacing interventions (Ops and DMPA injection) immunization and other services. Some of ORCs have Pucca infrastructure (building) supported by UNICEF and others that are under utilized as of now. If the periodicity (monthly now) can be increased the sick women and children can be benefited more. With average of three workers in each BHU this may be operationally feasible.

Maternal Care Clinics In District Hospitals:

Every hospital and BHU conducts a separate maternal care and child immunization clinic once a month at least. In most of the facilities both the sessions can be combined in view of small number attendance. At present getting the desegregated data on TT coverage of pregnant women is difficult. Though the country is propagating 5 dose schedule, the information on women completing 5 doses is not available. All facilities give TT shots to injured people freely, and most of the TT coverage and vaccine used is attributable to this component. One wonders if there is too much TT immunization particularly for the cohorts born after 1990's. RGOV may review and stream line the policy on TT vaccination.

There is a good scope to improve the quality of the antenatal and post natal care for the mothers and neonatal care. As of now it is dependant mainly on general duty nurses or ANMs. While fundal height and BP are recorded their monitoring to identify complications of pregnancy is not visible. It is informed that women delivering in the facilities do stay for 1-3 days. However, the assessment of a newborn to identify breast feeding problem and apparent illness is not practiced. The training of nursing staff and doctors in the district facilities to start with for quality ANC, PNC and essential newborn care will be value add. The same can be extended to BHU's in second phase.

IMCI:

Bhutan is one of the countries implementing IMCI (global model). Keeping in view the proportion of hospital deliveries including newborn (0-7 days) component will benefit the child survival in the country. Small proportion of doctors and health workers are trained but rarely practice for want of individual case sheets and supervision. The country has one of the best essential drug situations in the region. Facilitating capacity for supportive supervision and expansion of implementation ensuring practice of IM(N)CI by WHO and UNICEF would benefit child survival.

Birthing Seasonality:

The consultant was able to study the seasonality of birth in 2 facilities as the data was readily available. This and the BCG performance data indicate a clear cut seasonality (Jan-April low and September--December high). A detailed look at the information from household surveys may yield good information for immunization planning.

Injection safety:

While immunization program uses auto-disable syringes the other drugs are injected using disposable syringes.

Hospital Waste Management (Syringes And Needles):

While the needles are burnt or cut ,the final disposal is done by burning in a pit reasonably away from the facilities. The periodicity is uncertain; one could observe partial burning and dumped for more than a week in 1-2 cases. Though the immediate risk to provider and beneficiaries is taken care final disposal requires attention.

K. DEBRIEFING MEETINGS:

Two meeting were organized for debriefing. The first under the chairmanship of the director, DoPH was held on 25 July between 1000-1600 hrs. The DoPH was glad that it was timed so well to meet the needs of the GAVI's requirement of CC assessment for their assistance.

The presentation was generally well accepted. The DHOs were surprised to know that there is no stock control and therefore most of the wastage is occurring at the district and sub-district level. Having accepted the observations, and recommendations the DHOs were keen to practice and learn the practical way of vaccine estimation. The post lunch session was spent mainly to acquaint them the skills of vaccine estimation.

Final Briefing:

On 26 July the key meeting of briefing senior bureaucrats was held. It was chaired by the Director General of department of Medical Services. In his introductory remarks he said that the RGOB is aware of high vaccine wastage and it has been a big concern as most of these vaccines are being procured with the help of Donors. At the end of the presentation chairperson expressed satisfaction at the outcome of the study and the recommendations and appealed for the technical support in reviewing the national policies particularly in 1) Discontinuing BCG vaccine from the schedule 2. Reinforcing the policy of multi-dose vial policy (MDVP) and experimenting expansion of MDVP for the vaccines used in out reach sessions and 3.Mobiizing resources for the non-GAVI supported vaccines from all the partners. The DoPH and EPI manger requested support form UNICEF for the capacity building task especially at the district level immediately. The general response was positive from all others.

This meeting was preceded by an informal and briefing of the development partners. The representatives of WHO, JAICA and UNFPA attended. All of them were impressed by the detailed study and felt it reflected the ground realities. The JICA's representative reported that their assessment (2006) findings were similar though it was based on reviewing the stock of the vaccines received and issued with no verification or detailed efforts to find where most of the wastage occurred. He also felt happy that this report may be helpful to plead for the revival of JICA support to Bhutan for another 3 years. UNFPA representative was also happy to note the findings on the types of services being provided in out reach sessions and he appealed to include the recommendations for increasing the frequencies to improve reach of all services.

L. PLACES VISITED & PERSONS MET:

1. Thimphu: Ministry of Health, DoPH Office, Drugs Vaccine & Equipment Division, UNICEF Office, Jigme Dorji Wangchuk, National Referral Hospital, BHU Genekha and Thinlaygang and ORC at Wangchuk

Persons met: Dr.Dorji Wangchuk- Director General -Health, Dr. Ugen Dopchu DoPH Mr Nado Dupka- Deputy Secretaty Finance, Mr. Thinlay Dorji Deputy Secretary –Planning, Dr Gepke Hingst- Representative, Ms. Vathinee Jitjatrunt Dy. Rep, Dr Waheed, (DW) Health & nutrition officer, BB Mishra, Technical officer- JAICA, Dorji Phub, NPO WHO Country office, NPO-UNFPA Kinlay Fam APO, Bhutan Health Trust Fund and Sangay Nanjmo, Pharmacist DVED. Mr. Kado Information officer-MOH, Mr.Jambay-General Nurse, Mr Chenchu Gyeltsing HA at JDWNRH, Mr.Giri, second technician at Central Vaccine Stores and Mr. Kuenzang Norbu-BHW at ORC. HA, ANM and BHW at BHU Genekha and: Mr Dhan Singh BHW & Ms Dhan Maya Adhikari ANM at BHU Tinlaygang

2. Paro: District Hospital, BHU Drukgyel, ORC Mirsi, and BHU Dawakha

Persons met: Mr. Nimapelden-DHO, Ms MeeraChettri ANM- at MCH clinic, Mr.Karma, HA-BHU Dyukgel and Mr.Tushi Dendup-HA, Ms Chenchupen ANM- BHU Dawakha

3. Tsirang: DAMPHU General Hospital, and BHU Menderelgang, ORC Longe

Persons met: .Mr. Pema Wangchuk-DHO, Ugyen Dupa ACMO, Mr. Kadowangdi-HA, 2 BHWs and one ANM and Mr. Karma Dupa (BHW), Ms Dawadena-at BHU.

4. Sarpang: Regional Referral Hospital Geylephue, Community Health Unit, BHU Norbuling EPI vaccine store and BHU Jigmeling:

Persons met: Dr. Keunwang De DMO, DHO & ADHO RRH Gelephue, Mr. Doji Gyetshen BHW, Ms Dechenmo ANM RHU Sarpang. Ms Dechen Wangmo, Mr. Samba Dorji, BHW, Ms Tsering Chogen ANM at CHU, Mr.Melam Dorji HA & Ms Sonam Zangmo-ANM

Norbuling, Mr. Bim Thada & Ugen Cold chain technicians at regional vaccine stores. Mr. Amber Roy BHW, Lhajey Norbu Laboratory Technician at Jigmeling.

5. Wangdue: BHU Gr I, Bajo and BHU Sephu

Persons met: Dr. Ms Geetha-MO, Ms Denka- MCH in-charge and ms Hog ANM at Bajo, . Mr. Karma BHW Sephu.

6. Bhumthnag: District Hospital, DHO office, MCH clinic and BHU Ura,
Persons met: Dr. Nima DMO & Mr. Gopal Hingmang DHO. Ms Namgay Wangmo I/C & Ms Dhanmaya ANM - MCH Clinic Mr. Lachuman NeopaneyHA, BHU Ura.

7. Mongar: Regional referral Hospital, Regional Vaccine Stores, BHU Lingmethang & Yadi.
Persons met: Dr Thapa Gurung Suptd. ERRH, Mr Ngwang Peljang and Mr. Chewang Dorji Regional Vaccine Stores. RRH- Labour room Staff Nurse, MCH Clinic staff (2 HA's-F and 2 BHW-M), Mr C B Nepal- HA, Ms Durga Maya -ANM Lingmethang and. Mr. Y. N Sharma -Yadi

8. Trashigang: District Hospital, DHO office, BHU I-Kanglung
Persons met: Dr. Pelden Wangchuk MO, HA and GN of BHU. Chief Medical Officer and BHW and ANM- at CHC.

9. Trongsa: District Hospital and BHUs Trashling
Persons met: Dr Sonam Tshering DMO, Ms Dechenmo DHO, Mr Pema Dendup HA in District Hospital and Mr. Jas Bahadur BHW & Ms Dorji Lhamo ANM at BHU.

3

M. REFERENCES:

1. *EPI Manual,Bhutan-draft-2, Vaccine Preventable Diseases Program- 2007,RGOB*
2. *Quality of Cold Chain, WHO and EF joint Policy Statement- WHO/V &B/99.18*
3. *Vaccine Management Assessment Tool, March 2001*
4. *Management of Vaccine Wastage at country level., WHO/V&B/03.18*
5. *Common Country Assessment for Bhutan, UN system in Bhutan 2006*
6. *Annual Health Bulletin 2007, 2006,2005, Ministry of Health, RGOB, Thimphu*
7. *Population and Housing Census of Bhutan 2005, Office of the census Commissioner, RGOB*
8. *Immunization Handbook for Health Workers, MOH &FW, GOI, New-Delhi.*
9. *Cold Chain Equipments, maintenance and repairs- Manual for Technicians GOI 2003*
10. *Cold Chain and Health equipment Catalogue (red book), UNCEF Copenhagen 2006*