

**PHG Needs Assessment Calculator**  
**Bhutan**  
**Preconception Care and Screening**

Welcome to the PHG Health Needs Assessment Calculator for Preconception Care and Screening. The contents of this file are listed below.

Full name of the sheet	Short name
Country demographic, maternal health and socioeconomic indicators	Demography
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Risk factors for congenital disorders in women of reproductive age	PCCS-NA1.1
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Effect of folic acid fortification on birth incidence of congenital heart disease	PCCS-CHD
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Effect of preconception care on incidence of orofacial clefts	PNS-OFC
Effect of immunisation on rubella incidence in women	PNS-RUB
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Effect of preconception care on congenital disorders caused by teratogens	PNS-TER

**Bhutan****Shared Data****Demographic, maternal health and socio-economic indicators**

**Please read first! If you have already completed a needs assessment for a different topic in this country, you will be able to copy the Demography information from that Calculator into here. The information should be the same.**

**By default, the Toolkit contains information at the national level.**

**If you would like to use a different population, then replace country information with that of your specific population of interest.**

Number of persons by age-group and sex	Estimates			Your estimates			Chosen estimates		
Age group	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-4 years	31489	31064	62553			0			0
5-9 years	35547	34852	70399			0			0
10-14 years	38728	38279	77007			0			0
15-19 years	37504	37732	75236			0			0
20-24 years	40254	30320	70574			0			0
25-29 years	31386	25972	57358			0			0
30-34 years	23208	19598	42806			0			0
35-39 years	21124	17605	38729			0			0
40-44 years	16022	13878	29900			0			0
45-49 years	14895	12767	27662			0			0
50-54 years	11779	10268	22047			0			0
55-59 years	8764	7628	16392			0			0
60-64 years	7564	7010	14574			0			0
65+ years	15331	14414	29745			0			0
Total	0	0	634982	0	0	0	0	0	0
Female population aged 15-44 years		0			-			-	
Data year	in 2005								
Source, Year	UN 2011								

**Ethnicity. Please enter data for the main ethnic groups if you are working with a population that is different from that of the country.**

Ethnic group	Number	% population

<b>Fertility and mortality</b>	<b>Estimate</b>	<b>Source, Year</b>	<b>Your estimate</b>	<b>Source, Year</b>	<b>Chosen estimate</b>	<b>Source, Year</b>
Crude birth rate: live births (LB) / year / 1000 population	19	Unicef,				
Still birth rate (SB): Still births (SB) / year / 1000 total births	22	WHO, 2009				
Total births in 1000s (LB+SB) per year	12	Unicef,				
Infant mortality rate: infant deaths / 1000 LB / year	44	UNICEF				
Under-5 mortality rate: U5 deaths / 1000 LB / year	56	UNICEF				
Percentage births in women >35 years						
Life expectancy at birth (yrs)	63	WHO, 2009				
% of marriages consanguineous						

<b>Maternal health</b>	<b>Estimate</b>	<b>Source, Year</b>	<b>Your estimate</b>	<b>Source, Year</b>	<b>Chosen estimate</b>	<b>Source, Year</b>
Prenatal visits – at least 1 visit (%)	88	WHO, 2007				
Prenatal visits – at least 4 visits (%)						
Births attended by skilled health personnel (%)	71.5	WHO, 2007				
Contraception prevalence rate (%)						
Unmet need for family planning (%)						
Total fertility rate	2.6	WHO, 2009				
% home births						
% births at health care services						
<b>Newborn health</b>	<b>Estimate</b>	<b>Source, Year</b>	<b>Your estimate</b>	<b>Source, Year</b>	<b>Chosen estimate</b>	<b>Source, Year</b>
Number of neonatal examinations by SBA / trained staff						
% neonatal examinations by SBA / trained staff						

<b>Socio-economic indicators</b>	<b>Estimate</b>	<b>Year</b>	<b>Your</b>	<b>Source,</b>	<b>Chosen</b>	<b>Source,</b>
Gross national income per capita (PPP int. \$)	4820	WHO, 2008				
% population living on < US\$1 per day	26.2	WHO, 2003				
Birth registration coverage (%)						
Death registration coverage (%)						

LB = live births

PPP = purchasing power parity

SBA = skilled birth attendant

**Bhutan****Shared Data****Health services data**

**Please read first!** If you have already completed a needs assessment for a different topic in this country, you will be able to copy the Health Services information from that Calculator into here. The information should be the same.

This section provides health-service-related information for your country.

**By default, the Toolkit contains information at the national level.**

**If you would like to use a different population, then replace country information with that of your specific population of interest.**

<b>Health Expenditure</b>	<b>Estimate</b>	<b>Source, Year</b>	<b>Your estimate</b>	<b>Source, Year</b>	<b>Chosen estimate</b>	<b>Source, Year</b>
Per capita total expenditure on health (PPP int. \$)	274	WHO, 2009				
Total expenditure on health as percentage of GDP	5.5	WHO, 2009				
Per capita government expenditure on health (PPP int. \$)	224	WHO, 2009				
External resources for health as percentage of total expenditure on health	7.6	WHO, 2009				
General government expenditure on health as percentage of total expenditure on health	81.9	WHO, 2009				
Out-of-pocket expenditure as percentage of private expenditure on health	100.0	WHO, 2009				
Private expenditure on health as percentage of total expenditure on health	18.1	WHO, 2009				
General government expenditure on health as percentage of total government expenditure	13.3	WHO, 2009				

<b>Health Workforce</b>	<b>Estimate</b>	<b>Source, Year</b>	<b>Your estimate</b>	<b>Source, Year</b>	<b>Chosen estimate</b>	<b>Source, Year</b>
Number of nursing and midwifery personnel	545	WHO, 2007				
Nursing and midwifery personnel density (per 10,000 population)	3.2	WHO, 2007				
Number of physicians	52	WHO, 2007				
Physician density (per 10 000 population)	0.23	WHO, 2007				
Number of obstetricians						
Number of paediatricians						
Number of paediatric surgeons						
Number of paediatric cardiac surgeons						

Number of paediatric neurosurgeons						
Number of clinical geneticists						

Number of genetic counsellors						
Number of community health workers						
Number of skilled birth attendants (SBA)						
Density of SBA						
Number of lab staff providing cytogenetic testing						
Number of lab staff providing molecular genetics						
Number of lab staff providing biochemical tests for genetics						
Number of skilled health attendants						

Infrastructure	Estimate	Source, Year	Your estimate	Source, Year	Chosen estimate	Source, Year
Number of maternity units						
Number of services providing specialised care for people with CD						
Number of family planning services						
Number of preconception services						
Number of services providing prenatal care						
Number of services providing newborn care						
Number of facilities providing genetic services						
Number of laboratories providing cytogenetics						
Number of laboratories providing molecular genetics						
Number of laboratories providing biochemical tests for genetics						
Number of facilities for safe terminations of pregnancies for fetal defects						

PPP = purchasing power parity

GDP = gross domestic product

SBA = skilled birth attendant

CD = congenital disorders

**Bhutan****Preconception care and screening****Risk factors for congenital disorders in women of reproductive age**

<b>Risk factors</b>	<b>Proportion of women with risk factor</b>	<b>Qualitative assessment*</b>	<b>Variation</b>	<b>Source</b>
Obesity				
Diabetes				
Malnutrition				
Teratogen exposure: environmental, agricultural and occupational				
Exposure to teratogenic prescribed and non-prescribed medicines				
Syphilis				
Rubella susceptibility				
Rubella infection				
Other infections (e.g. CMV or HIV)				
Alcohol consumption				
Tobacco use				
Advanced maternal age (>35)				
Iodine deficiency				
Folate deficiency				
Other risk factors				

\* Complete if numerical data are unavailable. Use numbers from 1 to 5, where 1 = low importance and 5 = high importance.

**Bhutan****Preconception care and screening****Population prevalence and variation for genetic conditions**

Condition	Prevalence per 1000 TB	Prevalence variation and high-risk populations	Tick if PCCS available	Type of PCCS available
Thalassaemias				
Sickle cell disease				
Rhesus incompatibility				
G6PD deficiency				
Cystic fibrosis				
Other				

TB = total births (live births + still births)

PCCS = PreconCeption Care and Screening



**Bhutan****Preconception care and screening****Effect of folic acid fortification\* on birth incidence of congenital heart disease**

This sheet allows you to estimate the potential reduction in CHD prevalence through fortification of food with folic acid.

Please start by entering values reflecting your current situation. If you have no fortification programme, enter 0 for coverage.

Below, you may adjust dosage and coverage levels to demonstrate the effects of different intervention scenarios.

Current situation		Notes
Present estimated CHD prevalence per 1000 TB		
Present dosage (ppm)		Range: 1.5 to 3
Present coverage of fortification		Range: 0 to 1
Baseline CHD prevalence per 1000 TB, with no folic acid fortification* <sup>1</sup>		

Potential scenarios, based on your present situation		
Vary dosage (ppm)		Range: 1.5 to 3
Vary proportional population coverage		Range: 0 to 1
Estimated reduction in CHDs through folic acid fortification, per 1000 TB <sup>2</sup>	0.000	Do not delete this value!
Resulting prevalence of CHDs after folic acid fortification, per 1000 TB <sup>3</sup>	0.000	Do not delete this value!

ppm = parts per million

TB = total births (live births + still births)

\* The effect of folic acid on CHD is assumed to be 25% of the effect on neural tube defects.

The regression formula underlying the effect on neural tube defects is given in the NTD Calculator in this Toolkit.

\*\* Not considering the effects of other interventions on prevalence.

<sup>1</sup> $(\text{Present estimated prevalence} - (1.07 * \text{coverage} * 0.25) + (0.15 * \text{ppm} * \text{coverage} * 0.25)) / (1 - 0.88 * \text{coverage} * 0.25))$

<sup>2</sup> $((0.25 * (\text{Baseline CHD} - (1.07 * \text{coverage} + 0.12 * \text{baseline CHD} * \text{coverage} - 0.15 * \text{dosage} * \text{coverage} + \text{baseline} - \text{baseline} * \text{coverage}))))$

<sup>3</sup>Baseline CHD prevalence – estimated reduction in CHD after fortification

**Effects of folic acid supplementation on CHD**

<b>Effect of supplementation (with no fortification)</b>		Notes
Baseline prevalence with no folic acid intervention (per 1000 TB)		This can be taken from the appropriate cell above
Maximum proportional reduction (assuming 100% coverage)	0.18	This value is fixed at 0.18
Population supplementation coverage		Range: 0 to 1
Actual proportional reduction	0	Maximum proportional reduction x Coverage
Actual prevalence reduction (per 1000 TB)	0.000	Baseline prevalence x Actual proportional reduction
<b>New prevalence</b>	<b>0.000</b>	Baseline prevalence -((Maximum prop. Reduction x Population supplementation coverage) x Baseline prevalence))
% prevalence reduction	#DIV/0!	1-(New prevalence/Baseline prevalence)
Absolute prevalence reduction (per 1000 TB)	0.000	Baseline prevalence -New prevalence

Now you can see below the potential combined effect of folate fortification and supplementation:

<b>Additional effect of supplementation, given fortification</b>	0.1	This value can be changed.
	<b>New prevalence</b>	
After fortification		This can be taken from the appropriate cell above
After supplementation	0.000	Same as new prevalence
After fortification and supplementation		Prevalence after fortification-(Additional effect of supplementation*prevalence after supplementation)

TB = total births (live births + still births)

CHD = congenital heart disease

**Bhutan****Preconception care and screening****Effects of maternal age on incidence of Down's syndrome**

If you have an estimate for the birth prevalence of Down's syndrome, you can use the Calculator on the left.

If you have an estimate of the proportion of births that are to mothers aged over 35, you can use the Calculator on the right.

Birth prevalence per 1000 TB		
Proportional birth prevalence due to high maternal age <sup>1</sup>	#DIV/0!	
Birth prevalence attributable to high maternal age, per 1000 TB <sup>2</sup>	-0.86	
Baseline prevalence without maternal age effect	0.86	This figure is set at 0.86

TB = total births (live births + still births)

<sup>1</sup> $(\text{Birth prevalence} - 0.86) / \text{Birth prevalence}$

<sup>2</sup> $\text{Birth prevalence} - \text{Baseline prevalence}$

Proportion of mothers aged >35		Range: 0 to 1
Estimated birth prevalence per 1000 TB <sup>3</sup>	0.86	
Proportional birth prevalence due to high maternal age <sup>4</sup>	0.00	
Birth prevalence attributable to high maternal age, per 1000 TB <sup>5</sup>	0	
Baseline prevalence without maternal age effect	0.86	This figure is set at 0.86

<sup>3</sup> $0.86 + (7 * \text{Proportion of mothers aged >35})$

<sup>4</sup> $(\text{Estimated birth prevalence} - \text{Baseline prevalence}) / \text{Estimated birth prevalence}$

<sup>5</sup> $\text{Estimated birth prevalence} * \text{Proportional birth prevalence}$

**Bhutan****Preconception care and screening****Effect of preconception care on fetal alcohol spectrum disorders**

Baseline prevalence of FASD per 1000 total births (live + still)		
Baseline prevalence of unsafe alcohol consumption in women aged 15-44 per 1000		
Variables		
Proportion of women reducing alcohol consumption to safe levels before conception		Range: 0 to 1
Effectiveness of preconception intervention on the outcome		Range: 0 to 1
Results		
% prevalence reduction due to preconception intervention per 1000 total births <sup>1</sup>		0%
Final prevalence of unsafe alcohol consumption in women aged 15-44 per 1000 <sup>2</sup>		0.00
Final prevalence of FASD per 1000 births <sup>3</sup>		0.00

FASD = fetal alcohol spectrum disorder

<sup>1</sup>Prop. Women reducing alcohol consumption x Effectiveness of intervention

<sup>2</sup>Baseline prevalence of unsafe alcohol consumption - (% prevalence reduction due to intervention X baseline prevalence of unsafe alcohol consumption)

<sup>3</sup>Baseline prevalence of FASD - (% prevalence reduction due to preconception intervention X Baseline prevalence of FASD)

**Bhutan****Preconception care and screening****Effect of preconception folic acid fortification and supplementation on neural tube defects**

This sheet allows you to estimate the potential reduction in NTD prevalence through fortification of food with folic acid and supplementation.

Please start by entering values reflecting your current situation. If you have no fortification programme, enter 0 for coverage.

Below, you may adjust dosage and coverage levels to demonstrate the effects of different intervention scenarios.

Current situation		Notes
Present estimated NTD prevalence per 1000 TB		
Present dosage (ppm)		Range: 1.5 to 3
Present coverage of fortification		Range: 0 to 1
Baseline NTD prevalence per 1000 TB, with no folic acid fortification* <sup>1</sup>		
Minimum prevalence NTD / 1000 births	0.9	This value is fixed at 0.9

Potential scenarios, based on your present situation		
Vary dosage (ppm)		Range: 1.5 to 3
Vary proportional population coverage		Range: 0 to 1
Estimated NTD prevalence with this scenario, per 1000 TB <sup>2</sup>		<- Do not modify this cell!
Absolute prevalence reduction with this scenario, per 1000 TB <sup>3</sup>		<- Do not modify this cell!

ppm = parts per million

TB = total births (live births + stillbirths)

\* Not considering the effects of other interventions on prevalence.

<sup>1</sup>IF(B10="";"";IF(((B10-(1.07\*B12)+(0.15\*B11\*B12))/(1-0.88\*B12))<B15;B15;((B10-(1.07\*B12)+(0.15\*B11\*B12))/(1-0.88\*B12))))

<sup>2</sup> IF(B13=""; ""; IF(B13=0.9;0.9;IF((1.07\*B19+0.12\*B13\*B19-0.15\*(IF(B18="";B11;B18))\*B19+B13-B13\*B19)<B15;B15;(1.07\*B19+0.12\*B13\*B19-0.15\*(IF(B18="";B11;B18))\*B19+B13-B13\*B19))))

<sup>3</sup>IF(B20="";"";B13-B20)

See sheet NTD-Appx for explanation of regression.

**NTD Interventions 2: Effect of folic acid supplementation**

This sheet allows you to estimate the potential reduction in NTD incidence through folic acid supplementation for pregnant women. Please enter a value for population coverage of folic acid supplementation, to determine its potential effect.

<b>Effect of supplementation (with no fortification)</b>		Notes
Baseline prevalence with no folic acid intervention (per 1000 TB)		This can be taken from the appropriate cell (baseline NTD prevalence) in sheet NTD-Interv1.
Maximum proportional reduction (assuming 100% coverage)	0.72	This value is fixed at 0.72
Population supplementation coverage		Range: 0 to 1
Actual proportional reduction	0	Maximum proportional reduction x Coverage
Actual prevalence reduction (per 1000 TB)	0.000	Baseline incidence x Actual proportional reduction
Minimum prevalence	0.9	This value is fixed at 0.9
New prevalence	0.000	Baseline prevalence-((Maximum proportional reduction X Population supplementation coverage) x Baseline prevalence)
% prevalence reduction	#DIV/0!	1 – (New prevalence/Baseline prevalence)
Absolute prevalence reduction (per 1000 TB)	0.000	Baseline prevalence- New prevalence
<b>Final prevalence following supplementation</b>	<b>0.900</b>	Cannot go below 0.9 / 1000 LB

Now you can see below the potential combined effect of folate fortification and supplementation:

<b>Additional effect of supplementation, given fortification</b>		This value can be changed.
	<b>New prevalence</b>	
After fortification		This value set in sheet NTD-Interv1
After supplementation		
After fortification and supplementation	0.000	Requires input in blank cells above <sup>1</sup>
<b>% reduction</b>	<b>#DIV/0!</b>	Requires input in blank cells above <sup>2</sup>
<b>Final prevalence after fortification and supplementation</b>		

TB = total births (live births + stillbirths)

<sup>1</sup>New Prevalence after fortification-(Additional effect of supplementation x Final prev. following supplemen.)

<sup>2</sup>If New prevalence after fortification < minimum prevalence then use (Baseline prev – min prevalence)/baseline prevalence)

Otherwise use: (Baseline prevalence – new prevalence after fortification and supplementation)/baseline prevalence

**Bhutan****Preconception care and screening****Effect of preconception care on incidence of orofacial clefts****OFC Interventions 1: Effect of folic acid fortification\***

This sheet allows you to estimate the potential reduction in OFC prevalence through fortification of food with folic acid. Please start by entering values reflecting your current situation. If you have no fortification programme, enter 0 for coverage. Below, you may adjust dosage and coverage levels to demonstrate the effects of different intervention scenarios.

Current situation		Notes
Present estimated OFC prevalence per 1000 TB		
Present dosage (ppm)		Range: 1.5 to 3
Present coverage of fortification		Range: 0 to 1
<sup>1</sup> Baseline OFC prevalence per 1000 TB, with no folic acid fortification**		
Potential scenarios, based on your present situation		
Vary dosage (ppm)		Range: 1.5 to 3
Vary proportional population coverage		Range: 0 to 1
Estimated reduction in OFCs through folic acid fortification, per 1000 TB <sup>2</sup>	0.000	Do not delete this value!
Resulting prevalence of OFCs after folic acid fortification, per 1000 TB	0.000	Do not delete this value!

ppm = parts per million

TB = total births (live births + still births)

\* The effect of folic acid on OFCs is assumed to be 25% of the effect on neural tube defects.

The regression formula underlying the effect on neural tube defects is given in the NTD Calculator in this Toolkit.

\*\* Not considering the effects of other interventions on prevalence.

<sup>1</sup>(Present estimated prevalence-(1.07\*coverage\*0.25)+(0.15\*ppm\*coverage\*0.25))/(1-0.88\*coverage\*0.25)))

<sup>2</sup>((0.25\*(Baseline OFC-(1.07\*coverage+0.12\*baseline OFC\*coverage-0.15\*dosage\*coverage+baseline-baseline\*coverage))))

<sup>3</sup>Baseline OFC prevalence – estimated reduction in OFC after fortification

**OFC Interventions 2: Effect of folic acid supplementation**

<b>Effect of supplementation (with no fortification)</b>		Notes
Baseline prevalence with no folic acid intervention (per 1000 TB)		This can be taken from the appropriate cell above
Maximum proportional reduction (assuming 100% coverage)	0.18	This value is fixed at 0.18
Population supplementation coverage		Range: 0 to 1
Actual proportional reduction	0	Maximum proportional reduction x Coverage
Actual prevalence reduction (per 1000 TB)	0.000	Baseline incidence x Actual proportional reduction

<b>New prevalence</b>	<b>0.000</b>	Baseline prevalence with no intervention -((Maximum prop. Reduction x Pop. Supp. Coverage) X Baseline prevalence)
% prevalence reduction	#DIV/0!	1-(New prevalence/Baseline prevalence)
Absolute prevalence reduction (per 1000 TB)	0.000	Baseline prevalence – New prevalence

Now you can see below the potential combined effect of folate fortification and supplementation:

<b>Additional effect of supplementation, given fortification</b>		This value can be changed.
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	<b>New prevalence</b>	
After fortification		This can be taken from the appropriate cell (resulting OFC prevalence)
After supplementation	0.000	Requires input in blank cells above
After fortification and supplementation <sup>1</sup>		Requires input in blank cells above

TB = total births (live births + still births)

OFC = orofacial clefts

<sup>1</sup>Prevalence after fortification-(Additional effect of supplementation\*prevalence after supplementation)



**Bhutan****Preconception care and screening****Effect of immunisation on rubella incidence in women**

Baseline prevalence of rubella in women aged 15-44 per 1000		
Variables		
Coverage of rubella immunisation		Range: 0 to 1
Proportion of women of reproductive age receiving immunisation		Range: 0 to 1
Effectiveness of immunisation (proportion of cases prevented among those immunised)		Range: 0 to 1
Results		
% prevalence reduction due to immunisation <sup>1</sup>	0%	
Prevalence reduction due to immunisation, per 1000 women aged 15-44 <sup>2</sup>	0.000	
Final prevalence of rubella in women aged 15-44 per 1000 <sup>3</sup>	0.000	

TB = total births (live births + still births)

<sup>1</sup>(Coverage of immunisation X Proportion of women receiving immunisation) X Effectiveness of immunisation

<sup>2</sup>% prevalence reduction due to immunisation X Baseline prevalence of rubella in women

<sup>3</sup>Baseline prevalence of rubella in women – Prevalence reduction due to immunisation

**Bhutan****Preconception care and screening****Effect of preconception screening and treatment on incidence of syphilis**

Baseline prevalence of syphilis in pregnancy per 1000 TB		
Variables		
Coverage of preconception screening		Range: 0 to 1
Proportion of diagnosed cases receiving timely treatment		Range: 0 to 1
Effectiveness of treatment (proportion of cases prevented among those treated)		Range: 0 to 1
Results		
% prevalence reduction due to PCCS & treatment <sup>1</sup>	0%	
Prevalence reduction due to PCCS & treatment, per 1000 TB <sup>2</sup>	0.000	
Final prevalence of syphilis in pregnancy after PCCS & treatment, per 1000 TB <sup>3</sup>	0.000	

PCCS = preconception care and screening

TB = total births (live births + still births)

<sup>1</sup>(Coverage of screening X Proportion of women receiving treatment) X Effectiveness of treatment

<sup>2</sup>% prevalence reduction due to PCCS and treatment X Baseline prevalence of syphilis in pregnancy

<sup>3</sup>Baseline prevalence of syphilis in pregnancy – Prevalence reduction due to PCCS and treatment

**Bhutan****Preconception care and screening****Effect of preconception care on congenital disorders caused by teratogens**

Baseline prevalence of teratogen-induced congenital disorders per 1000 total births (live + still)		
Variables		
Proportion of women reducing teratogen risk to safe levels prior to pregnancy		Range: 0 to 1
Effectiveness of interventions on the outcome		Range: 0 to 1
Results		
% prevalence reduction due to intervention per 1000 total births <sup>1</sup>		0%
Final prevalence of teratogen-induced congenital disorders per 1000 births <sup>2</sup>		0.000

<sup>1</sup>Proportion of women reducing teratogen risk to safe levels prior to pregnancy x  
Effectiveness if outcome

<sup>2</sup>Baseline prevalence - (% prevalence reduction due to intervention X Baseline prevalence)