

## Economics of Primary Healthcare: Cost Estimation of Clinical Services at Primary Care Facilities in The Six Countries of The Gulf Cooperation Council.

Khalifa Elmusharaf, Sébastien Poix, Daniel Grafton, Johanna Jung, Rebecca Gribble, Rachael Stanton, Nicholas Banatvala, Lamia Mahmoud, Deena Alasfoor, Tayba Alawadi, Mohammed Mustafa, Lulwa Shuwaiter, Mohamed Alsuwaidan, Zahir Al-Abri, Sultana Al-Sabahi, Sherif Fiddah, Hassan Raza Syed, Muneera Almutairi, Yahya Al-Farsi, Dudley Tarlton

### Supplementary Materials

**Table S1. List of selected services by country**

Service	Bahrain	KSA	Kuwait	Oman	Qatar	UAE
<b>Immunization</b>						
Anti-rabies			X			
BCG vaccine	X	X	X	X	X	X
DPT vaccine	X		X	X	X	X
DT Adult			X			
DT paediatrics			X			
Heb B vaccine (paediatrics)			X			
Hep B vaccine	X				X	X
Hib vaccine	X				X	X
HPV vaccine		X				X
Influenza vaccine	X		X		X	X
Measles vaccine	X	X	X	X	X	X
Meningococcal vaccine			X			
Pentavalent vaccine		X	X	X		
Pneumococcal vaccine	X	X	X	X	X	X
Polio vaccine	X	X	X	X	X	X
Rotavirus vaccine	X		X		X	X
Rubella vaccine		X				
TT			X			
Varicella vaccine	X	X	X	X	X	
<b>Non-Communicable Diseases</b>						
<b>Breast Cancer</b>						
Basic breast cancer awareness	X	X	X	X	X	X
Diagnosis after screened with clinical breast exam			X	X		X
Diagnosis after screened with mammography						X
Diagnosis without screening for breast cancer						X
Diagnosis: screened with clinical breast exam		X				

Diagnosis: screened with mammogram		X				
Post-treatment surveillance for breast cancer patients		X				
Screening: clinical breast examination	X	X	X	X	X	X
<b>Service</b>	<b>Bahrain</b>	<b>KSA</b>	<b>Kuwait</b>	<b>Oman</b>	<b>Qatar</b>	<b>UAE</b>
Screening: mammography		X				X
<b>Cervical Cancer</b>						
HPV DNA + VIA						X
Papanicolaou test (pap smear)	X	X	X	X	X	X
Post-treatment surveillance for cervical cancer		X				
Visual inspection with acetic acid (VIA)						X
<b>Colorectal Cancer</b>						
Diagnosis for colorectal cancer screened with FIT						X
Diagnosis for colorectal cancer screened with FOBT		X				X
Diagnosis without screening for colorectal cancer (symptom based)		X				X
Post-treatment surveillance for colorectal cancer		X				
Screening: colonoscopy		X				
Screening: faecal immunochemical test						X
Screening: faecal occult blood testing	X	X	X	X	X	X
Screening: sigmoidoscopy		X				
<b>CVD &amp; Diabetes</b>						
Follow-up care for those at low risk of CVD/Diabetes (absolute Risk: 10-20%)	X	X	X	X	X	X
Intensive glycaemic control	X	X	X	X	X	X
Neuropathy screening and preventive foot care	X	X	X	X	X	X
Referral for retinopathy screening				X		
Retinopathy screening	X		X		X	X
Screening for risk of CVD/Diabetes	X	X	X	X	X	X
Standard glycaemic control	X	X	X	X	X	X
Treatment for those with absolute risk of CVD/Diabetes 20-30%	X	X	X	X	X	X
Treatment for those with established cerebrovascular disease and post stroke	X	X	X	X	X	X
Treatment for those with high absolute risk of CVD/Diabetes (>30%)	X	X	X	X	X	X
Treatment for those with high blood pressure but low absolute risk of CVD/Diabetes (< 20%)	X	X	X	X	X	X
Treatment for those with very high cholesterol but low absolute risk of CVD/Diabetes (< 20%)	X	X	X	X	X	X
Treatment of cases with established ischaemic heart disease (IHD)	X	X	X	X	X	X
Treatment of cases with rheumatic heart disease (with benzathine penicillin)	X	X			X	X
Treatment of new cases of acute myocardial infarction (AMI) with aspirin	X	X	X	X	X	X
<b>Emergency care</b>						
Average annual emergency care needs	X	X	X	X	X	X
<b>Oral Care</b>						

Dental cleaning and preventive care	X	X	X	X	X	
Oral and dental care						X
<b>Respiratory Diseases</b>						
<b>Service</b>	<b>Bahrain</b>	<b>KSA</b>	<b>Kuwait</b>	<b>Oman</b>	<b>Qatar</b>	<b>UAE</b>
Asthma: high dose inhaled beclomethasone + SABA	X		X		X	X
Asthma: high dose inhaled fluticasone + SABA		X		X		
Asthma: inhaled short acting beta agonist for intermittent asthma	X	X	X	X	X	X
Asthma: low dose inhaled beclomethasone + SABA	X		X		X	X
Asthma: low dose inhaled fluticasone + SABA		X		X		
Asthma: oral prednisolone + theophylline + high dose inhaled fluticasone + SABA		X		X		
Asthma: theophylline + high dose inhaled fluticasone + SABA		X		X		
COPD: exacerbation treatment with antibiotics	X	X	X	X	X	X
COPD: exacerbation treatment with oral prednisolone	X	X	X	X	X	X
COPD: exacerbation treatment with oxygen		X		X		X
COPD: inhaled salbutamol	X	X	X	X	X	X
COPD: ipratropium inhaler	X	X	X	X	X	X
COPD: low-dose oral theophylline	X	X	X	X	X	
COPD: smoking cessation	X	X	X	X	X	X
<b>Child Health</b>						
<b>Deworming</b>						
Deworming	X		X	X	X	
<b>Diarrhea management</b>						
Antibiotics for treatment of dysentery		X		X		X
ORS	X	X	X	X	X	X
Treatment of severe diarrhea		X				
Zinc (diarrhea treatment)		X		X		
<b>General</b>						
Zinc supplementation		X		X		
Child general health	X	X	X	X	X	X
School health	X				X	
<b>Malaria</b>						
Malaria treatment (0-4, mild cases)				X		
<b>Pneumonia</b>						
Pneumonia treatment (children)	X	X	X	X	X	X
Treatment of severe pneumonia		X				
<b>Routine Child Health Care Visit</b>						
Routine child health care visit (< 1 year)						X
Routine child health care visit (1-5 years)						X
<b>School Health Program</b>						

Dental screening				X		
Ear screening				X		
Eye screening				X		
<b>Service</b>	<b>Bahrain</b>	<b>KSA</b>	<b>Kuwait</b>	<b>Oman</b>	<b>Qatar</b>	<b>UAE</b>
<b>Nutrition</b>						
<b>Adults</b>						
Care for adults with food allergies and sensitivities						X
Care for adults with hyperuricemia						X
Care for adults with kidney diseases						X
Care for adults with low BMI	X	X	X	X	X	
Care for adults with nutritional anaemia						X
<b>Care for adults with other nutritional diseases</b>						
Care for diabetic adults						X
Care for obese adults						X
<b>All populations</b>						
Food fortification						X
<b>Children</b>						
Breastfeeding counselling and support	X	X	X	X	X	
Complementary feeding counselling and support	X	X	X	X		
<b>Feeding counselling and support for infants and young children in emergency situations</b>						
Intermittent iron supplementation in children	X		X	X	X	
Management of food allergies or food intolerances						X
Management of moderate acute malnutrition						X
Management of moderate acute malnutrition (children)		X		X		
Management of severe malnutrition						X
<b>Pregnant and lactating women</b>						
Calcium supplementation for prevention and treatment of pre-eclampsia and eclampsia				X		
Daily FAF, postpartum, anaemic women				X		
Daily iron and folic acid supplementation (pregnant women)	X	X	X	X	X	
Intermittent FAF, postpartum, non-anaemic pregnant women				X		
Intermittent iron and folic acid supplementation (non-anaemic pregnant women)	X	X	X	X	X	
Iodine supplementation in pregnant women		X				
Vitamin A supplementation in pregnant women		X				
<b>Women of reproductive age and adolescent girls</b>						
Intermittent iron-folic acid supplementation	X	X	X	X	X	
<b>Mental Health</b>						
<b>Alcohol use/ dependence</b>						
Identification and assessment of new cases of alcohol use/dependence				X		X

Brief interventions and follow-up for alcohol use/dependence		X		X		
Identification and assessment of new cases of alcohol use/dependence		X				
<b>Anxiety Disorders</b>						
<b>Service</b>	<b>Bahrain</b>	<b>KSA</b>	<b>Kuwait</b>	<b>Oman</b>	<b>Qatar</b>	<b>UAE</b>
Basic psychological treatment for anxiety disorders (mild cases).	X		X	X	X	X
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (mild-moderate cases)	X	X	X		X	X
Basic psychosocial treatment for anxiety disorders (mild cases)		X				
<b>Attention Disorders</b>						
Methylphenidate medication						X
<b>Bipolar Disorders</b>						
Basic psychosocial treatment, advice, and follow-up for bipolar disorder, plus mood-stabilizing medication		X				X
<b>Conduct Disorders</b>						
Basic psychosocial treatment, advice, and follow-up for behavioural disorders		X				X
<b>Dementia</b>						
Assessment, diagnosis, advice, and follow-up for dementia		X				X
Dementia screening, basic work up and referral to tertiary care				X		
Pharmacological treatment of dementia						X
<b>Depression</b>						
Basic psychosocial treatment and anti-depressant medication of first episode (mild to moderate cases)				X		
Basic psychosocial treatment and anti-depressant medication of first episode (moderate-severe cases)	X	X	X		X	X
Basic psychosocial treatment for mild depression	X	X	X	X	X	X
Intensive psychosocial treatment and anti-depressant medication of recurrent moderate-severe cases on a maintenance basis						X
Psychosocial care for perinatal depression						X
Psychosocial care for perinatal depression for mild cases only				X		
<b>Developmental Disorders</b>						
Basic psychosocial treatment, advice, and follow-up for developmental disorders		X				X
<b>Drug use/dependence</b>						
Brief interventions and follow-up for drug use/dependence		X		X		X
Identification and assessment of new cases of drug use/dependence		X		X		
<b>Epilepsy</b>						
Basic psychosocial support, advice, and follow-up only				X		
Basic psychosocial support, advice, and follow-up, plus anti-epileptic medication		X				X
<b>Psychosis</b>						
Basic psychosocial support and anti-psychotic medication		X		X		X
<b>Self-harm/suicide</b>						
Assess and care for person with self-harm		X		X		

Basic psychosocial treatment, advice, and follow-up for self-harm/suicide				X		
Pesticide intoxication management				X		
<b>Maternal Newborn and Reproductive Health</b>						
<b>Antenatal Care (ANC)</b>						
<b>Service</b>	<b>Bahrain</b>	<b>KSA</b>	<b>Kuwait</b>	<b>Oman</b>	<b>Qatar</b>	<b>UAE</b>
Antenatal Care (ANC)						X
<b>Childbirth care - Facility births</b>						
Feeding counselling and support for low-birth-weight infants				X		
Kangaroo mother care				X		
Labour and delivery management				X		
Manual removal of placenta				X		
MgSO4 for eclampsia				X		
Neonatal resuscitation				X		
Parenteral administration of uterotonics				X		
Pre-referral management of labour complications		X		X		
Treatment of local infections (newborn)				X		
<b>Family planning</b>						
Condom - male				X		
Contraception management					X	
Implant - Implanon (3 years)				X		
Injectable - 3 month (depo provera)	X		X	X		
IUCD follow-up care	X		X		X	
IUD - Copper-T 380-A IUD (10 years)		X		X		
Lactational amenorrhea method				X		
Other contraceptives	X		X			
Periodic abstinence				X		
Pill - progestin only	X		X	X		
Pill - standard daily regimen		X				
Standard days method				X		
Withdrawal		X		X		
Post-abortion case management			X		X	
<b>Management of ectopic pregnancy care</b>						
Ectopic case management				X		
<b>Menopause Program</b>						
Screen for mood disorders				X		
Screen for urogenital dryness				X		
<b>Other</b>						
Postmenopausal care			X			
Management of abnormal uterine bleeding			X			

Management of amenorrhoea			X			
Management of hirsutism			X			
Management of irregular cycles			X			
Management of mild endometriosis			X			
<b>Service</b>	<b>Bahrain</b>	<b>KSA</b>	<b>Kuwait</b>	<b>Oman</b>	<b>Qatar</b>	<b>UAE</b>
Management of PCO			X			
Management of pre pubertal problems (delayed menarche, infection)			X			
<b>Other sexual and reproductive health</b>						
Cervical cancer screening		X	X			
Identification and management of infertility	X	X	X	X	X	
Treatment of chlamydia	X	X	X	X	X	
Treatment of gonorrhoea	X	X	X	X	X	
Treatment of pelvic inflammatory disease	X	X	X	X	X	
Treatment of syphilis	X	X	X	X	X	
Treatment of trichomoniasis	X	X	X	X	X	
Treatment of urinary tract infection	X	X	X	X	X	
<b>Postpartum Care</b>						
Breast feeding education and advice	X		X		X	
Mastitis	X		X	X		
Postnatal care						X
Postpartum care examination					X	
Treatment of postpartum haemorrhage	X	X	X	X	X	
Maternal sepsis case management				X		
<b>Preconception Care (PCC)</b>						
Preconception care						X
<b>Pregnancy Care</b>						
Basic ANC	X	X	X	X	X	
Syphilis detection and treatment (pregnant women)	X		X		X	
Tetanus toxoid (pregnant women)	X	X	X	X	X	
Syphilis screening (pregnant women)				X		
<b>Pregnancy care - Treatment of pregnancy complications</b>						
Deworming (pregnant women)	X		X	X		
Hypertensive disorder case management		X		X		
Management of other pregnancy complications				X		
Management of pre-eclampsia (magnesium sulphate)				X		
<b>Premarital screening program</b>						
Premarital screening program						X
<b>General Practice</b>						
General practice	X	X	X	X	X	X

**Table S2. Assumptions used to estimate the population in need, drugs and supplies costs, and labour costs (all countries)**

Service	Population in Need	Drugs and Supply Costs	Labour Costs
Varicella vaccine	Children 1 and 5 years old, for the first and the second dose	USD 17.5 for one dose (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
Influenza vaccine	Children 0-5 + Pregnant women + People 65+	USD 2.39 for one dose (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
Retinopathy screening	People with diabetes should be screened every year (100%)	-	-
Neuropathy screening	People with diabetes should be screened every year (100%)	-	-
Clinical breast examination	Women aged 40-70 should be screened every 2 years (50%)	-	-
Diagnosis after screened with clinical breast examination	Based on country breast cancer incidence rate (WHO – IARC 2020)	-	-
Pap smear	Women 30-49 should be screened every 3 years (33%)	-	-
Faecal occult blood screening	People 50+ should be screened every 10 years (10%)	-	-
Dental cleaning and preventive care	All population	No costs estimated	Nurse (20 min) and Dentist (15 min) for one visit
General child health	Children 0-14	Cost per outpatient visit (WHO-CHOICE) – Labour costs	GP (15 min) for one visit
Pneumonia treatment	-	-	Nurse (20 min) + GP (20 min) for one visit
Daily iron and folic acid supplementation (anaemic pregnant women)	100% of anaemic pregnant women (World Bank)	-	-
Intermittent iron folic acid supplementation (non-anaemic pregnant women)	100% of non-anaemic pregnant women (World Bank)	-	-
Daily FAF, postpartum, non-anaemic women	Based on number of live births (Annual Health Statistics) and percentage of anaemic women (World Bank)		



Intermittent FAF, postpartum, anaemic women	Based on number of live births (Annual Health Statistics) and percentage of non-anaemic women (World Bank)		
Care for adults with low BMI	100% of underweight adults (Global Nutrition Report)	-	-
All mental health clinical services	Based on prevalence rates (Zuberi et al. 2021, GBD 2016 Epilepsy Collaborators, GBD 2016 Dementia Collaborators, WHO-EMRO, Atlas of Substance Disorder).	-	-
Treatment of postpartum haemorrhage (PPH)	Based on incidence rates of PPH	-	-
Identification and management of infertility	Based on regional prevalence (Eldib 2018) among adults 15-49 (3.8%)	-	-
Treatment of syphilis	Based on regional incidence rates (Kenyon et al. 2014) among adults 15-49 (2.2%)	-	-
Treatment of gonorrhoea	Based on regional incidence rates (Kenyon et al. 2014) among adults 15-49 (0.9%)	-	-
Treatment of chlamydia	Based on regional incidence rates (Kenyon et al. 2014) among adults 15-49 (1.9%)	-	-
Treatment of trichomoniasis	Based on regional incidence rates (Kenyon et al. 2014) among adults 15-49 (2.8%)	-	-
Treatment of pelvic inflammatory infection	Based on US incidence rate (Kresiel 2021) among adults 15-49 (3.6%)	-	-
General practice	All population	Cost per outpatient visit (WHO-CHOICE) – Labour costs	GP (15 min) for one visit
All Services	-	-	Community health workers time was allocated to nurses

**Table S2-A. Country-specific assumptions (Oman)**

Service	Population in Need	Drugs and Supply Costs	Labour Costs
School health program (eye screening)	Children in grade 1, 4, 7 and 10	No costs estimated	Nurse (10 min) for one visit
School health program (dental screening)	Children in grade 1	No costs estimated	Nurse (10 min) for one visit

School health program ( ear screening)	Children in grade 1 and 2	No costs estimated	Nurse (10 min) for one visit
Menopause program: screen for urogenital dryness, screen for mood disorders	Women 45-55 (100%)	No costs estimated	GP (15 min) for one visit
Elderly and community care program	People 60+	No costs estimated	Nurse (45 min) for one visit

**Table S2-B. Country-specific assumptions (Bahrain)**

Service	Population in Need	Drugs and Supply Costs	Labour Costs
School health	Children 5-19	No costs estimated	Nurse (10 min) for one visit

**Table S2-C. Country-specific assumptions (Kuwait)**

Service	Population in Need	Drugs and Supply Costs	Labour Costs
Meningococcal vaccine	PIN was not estimated since the number of visits was directly provided by MOH	USD 10.6 (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
DT adult vaccine	PIN was not estimated since the number of visits was directly provided by MOH	USD 1.8 (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
DT pediatrics vaccine	PIN was not estimated since the number of visits was directly provided by MOH	USD 1.8 (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
Anti-rabies vaccine	PIN was not estimated since the number of visits was directly provided by MOH	USD 48.6 (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
Hep B vaccine (paediatrics)	PIN was not estimated since the number of visits was directly provided by MOH	USD 3.24 (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
TT vaccine	PIN was not estimated since the number of visits was directly provided by MOH	USD 0.58 (WHO Review of vaccine price data)	Nurse (4 min) and GP (4 min) for one dose
Management of pre-pubertal problems	PIN was not estimated since the number of visits was directly provided by MOH	No costs estimated	Obs/Gyn (15 min) for one visit
Management of PCO, hirsutism, irregular cycles, amenorrhea, abnormal uterine bleeding, management of mild endometriosis, postmenopausal care	PIN was not estimated since the number of visits was directly provided by MOH	No costs estimated	Obs/Gyn (15 min) for one visit

**Table S2-D. Country-specific assumptions (Qatar)**

Service	Population in Need	Drugs and Supply Costs	Labour Costs
Child General Health	Children 0-14	Cost per outpatient visit (WHO-CHOICE) – Labour costs	GP (15 min) for one visit
School health	PIN was not estimated since the number of visits was directly provided by MOH	No costs estimated	Nurse (10 min) for one visit
Postpartum care examination	PIN was not estimated since the number of visits was directly provided by MOH	Cost per outpatient visit (WHO-CHOICE) – Labour costs	GP (10 min) and Midwife (20 min) for one visit
Allied health	PIN was not estimated since the number of visits was directly provided by MOH	Cost per outpatient visit (WHO-CHOICE) – Labour costs	Nurse (20 min) for one visit

**Table S2-E. Country-specific assumptions (UAE)**

Service	Population in Need	Drugs and Supply Costs	Labour Costs
<b>Screening: mammography</b>	Women aged 40-70 should be screened every 2 years (50%)	-	-
<b>Diagnosis for breast cancer</b>	Based on country breast cancer incidence rate (WHO – IARC 2020)	-	-
<b>Visual inspection with acetic acid, HPV DNA + VIA.</b>	Based on country cervix cancer incidence rate (WHO – IARC 2020)	-	-
<b>Screening; faecal immunochemical test</b>	Based on country colorectal cancer incidence rate (WHO – IARC 2020)	-	-
<b>Diagnosis for colorectal cancer</b>	Based on country colorectal cancer incidence rate (WHO – IARC 2020)	-	-
<b>Routine child healthcare visit (1 year)</b>	Children 0-12 months (100%)	Estimate based on OHT drugs and supplies prices: USD 19.7	Nurse (20 min), GP (10 min)
<b>Routine child healthcare visit (1-5 years)</b>	Children 12-59 months (100%)	Estimate based on OHT drugs and supplies prices: USD 2.8	Nurse (20 min), GP (10 min)
<b>Nutrition: Care for obese adults</b>	People with obesity (Global Nutrition Report)	No costs estimated	GP (10 min)
<b>Nutrition: Care for diabetic adults</b>	People with diabetes (OHT)	No costs estimated	GP (10 min)

<b>Nutrition: Care for adults with kidney diseases</b>	Adults with chronic kidney disease (Al-Shamsi et al. 2018)	No costs estimated	GP (10 min)
<b>Nutrition: Care for adults with nutritional anaemia</b>	Adults with anaemia (Global Nutrition Report)	No costs estimated	GP (10 min)
<b>Nutrition: Care for adults with food allergies and sensitivities</b>	People with nutrition-related allergies (Althumiri et al. 2021)	No costs estimated	GP (10 min), Specialist Doctor (30 min)
<b>Management of food allergies and food intolerance</b>	Children 0-14 x Global Prevalence of Allergies (3.0%)	No costs estimated	GP (10 min), Specialist Doctor (30 min)
<b>Preconception care</b>	Married women or planning for marriage at reproductive age (15-49 years)	Estimate based on OHT drugs and supplies prices: USD 4.90	Nurse (15 min), GP (15 min)
<b>Antenatal care</b>	Pregnant women	Estimate based on OHT drugs and supplies prices: USD 36.42	GP (40 min), Radiographer (20 min), Midwife (40 min)
<b>Postnatal care</b>	Women who gave birth	No costs estimated	Nurse (15 min), GP (15 min)
<b>Premarital screening program</b>	Women (15-49) planning for a marriage	Estimate based on OHT drugs and supplies prices: USD 15.66	Nurse (15 min), GP (15 min)

**Table S2-F. Country-specific assumptions (KSA)**

Service	Population in Need	Drugs and Supply Costs	Labour Costs
<b>Screening: mammography</b>	Women aged 40-70 should be screened every 2 years (50%)	-	-
<b>Post-treatment surveillance for breast cancer patients</b>	Based on country breast cancer incidence rate (WHO – IARC 2020)	-	-
<b>Post treatment surveillance for cervical cancer</b>	Based on country cervix cancer incidence rate (WHO – IARC 2020)	-	-
<b>Screening: Sigmoidoscopy, colonoscopy</b>	People 50+ should be screened every 10 years (10%)	-	-
<b>Post treatment surveillance for colorectal cancer</b>	Based on country colorectal cancer incidence rate (WHO – IARC 2020)	-	-

**Table S3. References and assumptions used to estimate the total number of services delivered in 2019 in Oman**

Immunization	Reference / Assumption
Measles vaccine	MOH Health Statistics 2019 <sup>1</sup>
Pentavalent vaccine	
Varicella vaccine	
DPT vaccination	
Polio vaccine	
BCG vaccine	
Pneumococcal vaccine	
<b>Non-Communicable Diseases</b>	
<b>CVD &amp; Diabetes</b>	
Screening for risk of CVD/Diabetes	Assumption: 5.0%
Follow-up care for those at low risk of CVD/Diabetes (Absolute Risk: 10-20%)	Assumption: 5.0%
Treatment for those with very high cholesterol but low absolute risk of CVD/Diabetes (< 20%)	Assumption derived from UHC Service Coverage Sub-Index on NCDs <sup>2</sup>
Treatment for those with high blood pressure but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with absolute risk of CVD/Diabetes 20-30%	
Treatment for those with high absolute risk of CVD/Diabetes (>30%)	
Treatment of new cases of acute myocardial infarction (AMI) with aspirin	
Treatment of cases with established ischaemic heart disease (IHD)	
Treatment for those with established cerebrovascular disease and post stroke	
Standard glycaemic control	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Intensive glycaemic control	
Referral for retinopathy screening	
Neuropathy screening and preventive foot care	
<b>Breast Cancer</b>	
Basic breast cancer awareness	Assumption: 5.0%
Screening: clinical breast examination (CBE)	MOH Health Statistics <sup>1</sup>
Diagnosis after screened with clinical breast exam	Assumption derived from WHO-IARC 2020 <sup>3</sup>
<b>Cervical Cancer</b>	
Papanicolaou test (pap smear)	Assumption derived from Bahrain CR
<b>Colorectal Cancer</b>	
Screening: faecal occult blood testing	Assumption derived from 'CBE'
<b>Elderly and community care program</b>	
Elderly and community care program	MOH Health Statistics 2019 <sup>1</sup>
<b>Respiratory Disease</b>	

Asthma: Inhaled short acting beta agonist for intermittent asthma	MOH Health Statistics 2019 <sup>1</sup>
Asthma: Low dose inhaled fluticasone + SABA	
Asthma: High dose inhaled fluticasone + SABA	
Asthma: Theophylline + High dose inhaled fluticasone + SABA	
Asthma: Oral Prednisolone + Theophylline + High dose inhaled fluticasone + SABA	
COPD: smoking cessation	
COPD: inhaled salbutamol	
COPD: low-dose oral theophylline	
COPD: ipratropium inhaler	
COPD: Exacerbation treatment with antibiotics	
COPD: Exacerbation treatment with oral prednisolone	
COPD: Exacerbation treatment with oxygen	
Emergency care	
Average annual emergency care needs	N/A
<b>Child Health</b>	
General	
Child general health	Assumption: 25% of GP visits (MOH Health Statistics 2019 <sup>1</sup> )
Deworming	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Zinc supplementation	
Diarrhea management	
ORS	
Zinc (diarrhea treatment)	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Antibiotics for treatment of dysentery	
Pneumonia	
Pneumonia treatment (children, mild cases)	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Malaria	
Malaria treatment (0-4, mild cases)	Estimate from MOH Health Statistics 2019 <sup>1</sup>
School Health Program	
Eye screening	MOH Health Statistics 2019 <sup>1</sup>
Dental screening	
Ear screening	
<b>Nutrition</b>	
Women of reproductive age and adolescent girls	
Intermittent iron-folic acid supplementation	Assumption: 5%
Pregnant and lactating women	
Daily iron and folic acid supplementation (pregnant women)	Estimate from MOH Health Statistics 2019 <sup>1</sup>

Intermittent iron and folic acid supplementation (non-anaemic pregnant women)	
Calcium supplementation for prevention and treatment of pre-eclampsia and eclampsia	
Daily FAF, postpartum, anaemic women	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Intermittent FAF, postpartum, non-anaemic pregnant women	
Adults	
Care for adults with low BMI	Assumption: 2.5%
Children	
Breastfeeding counselling and support	MOH Health Statistics 2019 <sup>1</sup>
Complementary feeding counselling and support	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Intermittent iron supplementation in children	
Management of moderate acute malnutrition (children)	MOH Health Statistics 2019 <sup>1</sup>
Mental Health	
Anxiety Disorders	
Basic psychological treatment for anxiety disorders (mild cases).	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (mild to moderate cases)	
Depression	
Basic psychosocial treatment for mild depression	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Basic psychosocial treatment and anti-depressant medication of first episode (mild to moderate cases)	
Psychosocial care for peri-natal depression for mild cases only	
Psychosis	
Basic psychosocial support and anti-psychotic medication	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Epilepsy	
Basic psychosocial support, advice, and follow-up only	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Dementia	
Dementia screening, basic work up and referral to tertiary care	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Alcohol use/ dependence	
Identification and assessment of new cases of alcohol use/dependence	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Brief interventions and follow-up for alcohol use/dependence	
Drug use/dependence	
Identification and assessment of new cases of drug use/dependence	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Brief interventions and follow-up for drug use/dependence	
Self-harm/suicide	
Assess and care for person with self-harm	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Basic psychosocial treatment, advice, and follow-up for self-harm/suicide	
Pesticide intoxication management	
Maternal Newborn and Reproductive Health	

Family planning	
Pill - Progestin only	MOH Health Statistics 2019 <sup>1</sup>
Condom - Male	
Injectable - 3 month (Depo Provera)	
IUD - Copper-T 380-A IUD (10 years)	
Implant - Implanon (3 years)	Assumption: 0.5%
LAM (Lactational Amenorrhea Method)	MOH Health Statistics 2019 <sup>1</sup>
SDM (Standard Days Method)	
Periodic abstinence	
Withdrawal	
Management of ectopic pregnancy care	
Ectopic case management	Assumption: 100%
Pregnancy care - ANC	
Tetanus toxoid (pregnant women)	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Syphilis screening (pregnant women)	MOH Health Statistics 2019 <sup>1</sup>
Basic ANC	
Pregnancy care - Treatment of pregnancy complications	
Hypertensive disorder case management	Assumption: 99%
Management of pre-eclampsia (Magnesium sulphate)	
Management of other pregnancy complications	
Deworming (pregnant women), part of general care and not specific for pregnant women	Assumption derived from UHC Service Coverage Sub-Index on RMNH (WHO) <sup>2</sup>
Childbirth care - Facility births	
Parenteral administration of uterotonics	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Labour and delivery management	
Pre-referral management of labour complications	
MgSO <sub>4</sub> for eclampsia	
Neonatal resuscitation	
Treatment of local infections (newborn)	
Kangaroo mother care	
Feeding counselling and support for low-birth-weight infants	
Manual removal of placenta	
Postpartum care - Treatment of sepsis	
Maternal sepsis case management	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Postpartum care - Other	
Mastitis	Estimate from UHC Service Coverage Sub-Index on RMNH (WHO) <sup>2</sup>
Treatment of postpartum haemorrhage	Assumption: 100%



Other sexual and reproductive health	
Treatment of urinary tract infection (UTI)	MOH Health Statistics 2019 <sup>1</sup>
Identification and management of infertility	
Treatment of syphilis	
Treatment of gonorrhoea	
Treatment of chlamydia	
Treatment of trichomoniasis	
Treatment of PID (Pelvic Inflammatory Disease)- mild cases only	
Menopause Program	
Screen for urogenital dryness	Assumption: 7.5%
Screen for mood disorders	Assumption: 7.5%
General Practice	
General Practice	Estimate from MOH Health Statistics 2019 <sup>1</sup>
Oral Care	
Dental cleaning and preventive care	MOH Health Statistics 2019 <sup>1</sup>

**Table S4. References and assumptions used to estimate the total number of services delivered in 2019 in Bahrain**

Immunization	
Rotavirus vaccine	MOH Health Statistics 2019 <sup>4</sup>
Measles vaccine	
DPT vaccine	
Hib vaccine	
Hep B vaccine	
Polio vaccine	
BCG vaccine	
Pneumococcal vaccine	
Varicella vaccine	Estimate from MOH Health Statistics 2019 <sup>4</sup>
Influenza vaccine	MOH Health Statistics 2019 <sup>4</sup>
Non-Communicable Diseases	
CVD & Diabetes	
Screening for risk of CVD/Diabetes	Assumption: 5.0%
Follow-up care for those at low risk of CVD/Diabetes (Absolute Risk: 10-20%)	Estimate from MOH Health Statistics 2019 <sup>4</sup>
Treatment for those with very high cholesterol but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with high blood pressure but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with absolute risk of CVD/Diabetes 20-30%	

Treatment for those with high absolute risk of CVD/Diabetes (>30%)	
Treatment of new cases of acute myocardial infarction (AMI) with aspirin	
Treatment of cases with established ischaemic heart disease (IHD)	
Treatment for those with established cerebrovascular disease and post stroke	
Treatment of cases with rheumatic heart disease (with benzathine penicillin)	
Standard glycaemic control	Estimate from MOH Health Statistics 2019 <sup>4</sup>
Intensive glycaemic control	
Retinopathy screening	
Neuropathy screening and preventive foot care	
Breast Cancer	
Basic breast cancer awareness	Assumption: 5.0%
Screening: clinical breast examination (CBE)	MOH Health Statistics 2019 <sup>4</sup>
Cervical Cancer	
Papanicolaou test (pap smear)	MOH Health Statistics 2019 <sup>4</sup>
Colorectal Cancer	
Screening: faecal occult blood testing	Estimate from 'CBE' and 'pap smear'
Respiratory Disease	
Asthma: Inhaled short acting beta agonist for intermittent asthma	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>2</sup>
Asthma: low dose inhaled beclomethasone + SABA	
Asthma: high dose inhaled beclomethasone + SABA	
COPD: smoking cessation	
COPD: inhaled salbutamol	
COPD: low-dose oral theophylline	
COPD: ipratropium inhaler	
COPD: exacerbation treatment with antibiotics	
COPD: exacerbation treatment with oral prednisolone	
Emergency care	
Average annual emergency care needs	N/A
Child Health	
General Health	
Child general health	Assumption: 25% of total number of GP Visit (MOH Health Statistics 2019 <sup>4</sup> )
School Health	
School Health	MOH Health Statistics 2019 <sup>4</sup>
Deworming	
Deworming	Assumption derived from UHC Service Coverage Sub-Index on Infectious Disease (WHO) <sup>2</sup>
Diarrhea management	

ORS	Assumption derived from UHC Service Coverage Sub-Index on Infectious Disease (WHO) <sup>2</sup>
Pneumonia	
Pneumonia treatment (children)	Assumption derived from UHC Service Coverage Sub-Index on Infectious Disease (WHO) <sup>2</sup>
Nutrition	
Women of reproductive age and adolescent girls	
Intermittent iron-folic acid supplementation	Assumption: 5.0%
Pregnant and lactating women	
Daily iron and folic acid supplementation (pregnant women)	Assumption derived from UHC Service Coverage Sub-Index on RMCH (WHO) <sup>2</sup>
Intermittent iron and folic acid supplementation (non-anaemic pregnant women)	
Adults	
Care for adults with low BMI	Estimate from MOH Health Statistics 2019 <sup>4</sup>
Children	
Breastfeeding counselling and support	Assumption derived from UHC Service Coverage Sub-Index on RMCH (WHO) <sup>2</sup>
Complementary feeding counselling and support	
Intermittent iron supplementation in children	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Mental Health	
Anxiety Disorders	
Basic psychological treatment for anxiety disorders (mild cases).	Estimate from MOH Health Statistics 2019 <sup>4</sup>
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)	
Depression	
Basic psychosocial treatment for mild depression	Estimate from MOH Health Statistics 2019 <sup>4</sup>
Basic psychosocial treatment and anti-depressant medication of first episode moderate-severe cases	
Maternal Newborn and Reproductive Health	
Family planning	
Pill - Progestin only	United Nations 2019 <sup>5</sup>
Injectable - 3 month (Depo Provera)	
Other contraceptives	
IUCD follow-up care	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Pregnancy Care	
Tetanus toxoid (pregnant women)	Estimate from MOH Health Statistics 2019 <sup>4</sup>
Syphilis detection and treatment (pregnant women)	
Basic ANC	
Breast feeding education and advices	
Pregnancy care - Treatment of pregnancy complications	
Deworming (pregnant women)	Assumption: 100%
Postpartum care - Other	

Mastitis	Assumption derived from UHC Service Coverage Sub-Index on RMCH (WHO) <sup>2</sup>
Breast feeding education and advices	
Treatment of postpartum haemorrhage	Assumption: 100%
Other sexual and reproductive health	
Treatment of urinary tract infection (UTI)	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Identification and management of infertility	
Treatment of syphilis	
Treatment of gonorrhoea	
Treatment of chlamydia	
Treatment of trichomoniasis	
Treatment of PID (Pelvic Inflammatory Disease)	
General Practice	
General Practice	MOH Health Statistics 2019 <sup>4</sup>
Oral Care	
Dental cleaning and preventive care	MOH Health Statistics 2019 <sup>4</sup>

**Table S5. References and assumptions used to estimate the total number of services delivered in 2019 in Kuwait**

Immunization	
Rotavirus vaccine	MOH Health Statistics 2019 <sup>6</sup>
Measles vaccine	
Pentavalent vaccine	
DPT vaccine	
Polio vaccine	
BCG vaccine	
Pneumococcal vaccine	
Varicella vaccine	
DT Adult	
Measles vaccine	Provided by MOH
Varicella vaccine	
Influenza vaccine	
Meningococcal vaccine	
DT paediatrics	
Anti-Rabies	
Heb B vaccine (paediatrics)	
TT	

Non-Communicable Diseases	
CVD & Diabetes	
Screening for risk of CVD/Diabetes	Assumption: CR = 5.0%
Follow-up care for those at low risk of CVD/Diabetes (Absolute Risk: 10-20%)	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>2</sup>
Treatment for those with very high cholesterol but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with high blood pressure but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with absolute risk of CVD/Diabetes 20-30%	
Treatment for those with high absolute risk of CVD/Diabetes (>30%)	
Treatment of new cases of acute myocardial infarction (AMI) with aspirin	Provided by MOH
Treatment of cases with established ischaemic heart disease (IHD)	
Treatment for those with established cerebrovascular disease and post stroke	
Standard glycaemic control	Estimate from MOH Health Statistics 2019 <sup>6</sup>
Intensive glycaemic control	
Retinopathy screening	
Neuropathy screening and preventive foot care	
Breast Cancer	
Basic breast cancer awareness	Assumption: CR = 5.0%
Screening: clinical breast examination	Assumption derived from Oman
Diagnosis after screened with clinical breast exam	Estimate from WHO-IARC 2020 <sup>3</sup>
Cervical Cancer	
Papanicolaou test (pap smear)	Provided by MOH
Colorectal Cancer	
Screening: faecal occult blood testing	Provided by MOH
Respiratory Disease	
Asthma: inhaled short acting beta agonist for intermittent asthma	Estimation from data provided by MOH
Asthma: low dose inhaled beclomethasone + SABA	
Asthma: high dose inhaled beclomethasone + SABA	
COPD: smoking cessation	
COPD: inhaled salbutamol	
COPD: low-dose oral theophylline	
COPD: ipratropium inhaler	
COPD: exacerbation treatment with antibiotics	
COPD: exacerbation treatment with oral prednisolone	
Emergency care	
Average annual emergency care needs	N/A
Child Health	

General Health	
Child general health	MOH Health Statistics 2019 <sup>6</sup>
Deworming	
Deworming	Provided by MOH
Diarrhea management	
ORS	Estimate based on data provided by MOH
Pneumonia	
Pneumonia treatment (children)	Provided by MOH
Nutrition	
Women of reproductive age and adolescent girls	
Intermittent iron-folic acid supplementation	Estimate from data provided by MOH
Pregnant and lactating women	
Daily iron and folic acid supplementation (pregnant women)	Assumption derived from UHC Service Coverage Sub-Index on MRCH (WHO) <sup>2</sup>
Intermittent iron and folic acid supplementation (non-anaemic pregnant women)	
Adults	
Care for adults with low BMI	Assumption derived from Bahrain
Children	
Breastfeeding counselling and support	Assumption derived from UHC Service Coverage Sub-Index on MRCH (WHO) <sup>2</sup>
Complementary feeding counselling and support	
Intermittent iron supplementation in children	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Mental Health	
Anxiety Disorders	
Basic psychological treatment for anxiety disorders (mild cases).	OneHealth Tool <sup>7</sup>
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)	
Depression	
Basic psychosocial treatment for mild depression	OneHealth Tool <sup>7</sup>
Basic psychosocial treatment and anti-depressant medication of first episode moderate-severe cases	
Maternal Newborn and Reproductive Health	
Family planning	
Pill - Progestin only	United Nations 2019 <sup>5</sup>
Injectable - 3 month (depo provera)	
Other contraceptives	
IUCD follow-up care	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Management of abortion complications	
Post-abortion case management	Assumption (70.0%)
Pregnancy Care	

Tetanus toxoid (pregnant women)	Estimate based on data provided by MOH.
Syphilis detection and treatment (pregnant women)	
Basic ANC	
Breast feeding education and advices	
Pregnancy care - Treatment of pregnancy complications	
Deworming (pregnant women)	Assumption (100.0%)
Postpartum care - Other	
Mastitis	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Breast feeding education and advices	
Treatment of postpartum haemorrhage	Estimate based on data provided by MOH.
Other sexual and reproductive health	
Treatment of urinary tract infection (UTI)	Provided by MOH
Cervical cancer screening	
Identification and management of infertility	
Treatment of syphilis	Estimate based on data provided by MOH
Treatment of gonorrhoea	Provided by MOH
Treatment of chlamydia	Estimate based on data provided by MOH
Treatment of trichomoniasis	
Treatment of PID (Pelvic Inflammatory Disease)	Provided by MOH
Other	
Management of pre pubertal problems	Provided by MOH
Management of PCO	
Management of hirsutism	Estimate based on data provided by MOH
Management of irregular cycles	Provided by MOH
Management of amenorrhoea	
Management of abnormal uterine bleeding	
Management of mild endometriosis	
Postmenopausal care	
General Practice	
General Practice	MOH Health Statistics 2019 <sup>6</sup>
Oral Care	
Dental cleaning and preventive care	MOH Health Statistics 2019 <sup>6</sup>

**Table S6. References and assumptions used to estimate the total number of services delivered in 2019 in Qatar**

Immunization	
Rotavirus vaccine	Global Health Observatory (WHO) <sup>2</sup>
Measles vaccine	Qatar Health Statistics 2019 <sup>8</sup>
DPT vaccine	
Hib vaccine	
Hep B vaccine	
Polio vaccine	
BCG vaccine	
Pneumococcal vaccine	
Varicella vaccine	Estimate from Qatar Health Statistics 2019 <sup>8</sup>
Influenza vaccine	Assumption derived from GCC countries
Non-Communicable Diseases	
CVD & Diabetes	
Screening for risk of CVD/Diabetes	Assumption: 5%
Follow-up care for those at low risk of CVD/Diabetes (Absolute Risk: 10-20%)	Estimate from PHCC Official Statistics
Treatment for those with very high cholesterol but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with high blood pressure but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with absolute risk of CVD/Diabetes 20-30%	
Treatment for those with high absolute risk of CVD/Diabetes (>30%)	
Treatment of new cases of acute myocardial infarction (AMI) with aspirin	
Treatment of cases with established ischaemic heart disease (IHD)	
Treatment for those with established cerebrovascular disease and post stroke	
Treatment of cases with rheumatic heart disease (with benzathine penicillin)	
Standard glycaemic control	
Intensive glycaemic control	
Retinopathy screening	Assumption: 1%
Neuropathy screening and preventive foot care	Assumption: 1%
Breast Cancer	
Basic breast cancer awareness	Assumption: 5%
Screening: Clinical Breast Examination	Assumption derived from GCC countries and PHCC Official Statistics
Cervical Cancer	
Papanicolaou test (Pap smear)	Assumption derived from GCC countries and PHCC Official Statistics
Colorectal Cancer	
Screening: Fecal occult blood testing	Assumption derived from GCC countries and PHCC Official Statistics
Allied Health	
Allied Health	PHCC Official Statistics



Respiratory Disease	
Asthma: Inhaled short acting beta agonist for intermittent asthma	PHCC Official Statistics
Asthma: Low dose inhaled beclomethasone + SABA	
Asthma: High dose inhaled beclomethasone + SABA	
COPD: Smoking cessation	
COPD: Inhaled salbutamol	
COPD: Low-dose oral theophylline	
COPD: Ipratropium inhaler	
COPD: exacerbation treatment with antibiotics	
COPD: exacerbation treatment with oral prednisolone	
Emergency care	
Average annual emergency care needs	N/A
Child Health	
General Health	
Child General Health	Estimate from PHCC Official Statistics
General Health	
School Health	PHCC Official Statistics
Deworming	
Deworming	PHCC Official Statistics
Diarrhea management	
ORS	Assumption derived from UHC Service Coverage Index for Infectious Diseases <sup>2</sup>
Pneumonia	
Pneumonia treatment (children)	Assumption derived from UHC Service Coverage Index for Infectious Diseases <sup>2</sup>
Nutrition	
Women of reproductive age and adolescent girls	
Intermittent iron-folic acid supplementation	Assumption: 50%
Pregnant and lactating women	
Daily iron and folic acid supplementation (pregnant women)	Estimate from data provided by PHCC Official Statistics and World Bank <sup>9</sup>
Intermittent iron and folic acid supplementation (non-anaemic pregnant women)	
Adults	
Care for adults with low BMI	Assumption: 2.5%
Children	
Breastfeeding counselling and support	Assumption: 70%
Intermittent iron supplementation in children	Assumption derived from Zainel et al. (2018) <sup>10</sup>
Mental Health	
Anxiety Disorders	
Basic psychological treatment for anxiety disorders (mild cases).	PHCC Official Statistics
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)	
Depression	

Basic psychosocial treatment for mild depression	PHCC Official Statistics
Basic psychosocial treatment and anti-depressant medication of first episode moderate-severe cases	
Maternal Newborn and Reproductive Health	
Family planning	
Contraception Management	Estimate from PHCC Official Statistics
Management of abortion complications	
Post-abortion case management	Estimate from PHCC Official Statistics
Pregnancy Care	
Tetanus toxoid (pregnant women)	Estimate from PHCC Official Statistics
Syphilis detection and treatment (pregnant women)	
Basic ANC	
Breast feeding education and advices	
Postpartum care - Other	
Postpartum Care Examination	PHCC Official Statistics
Treatment of postpartum haemorrhage	
Other sexual and reproductive health	
Treatment of urinary tract infection (UTI)	PHCC Official Statistics
Identification and management of infertility	
Treatment of syphilis	
Treatment of gonorrhoea	
Treatment of chlamydia	
Treatment of trichomoniasis	
Treatment of PID (Pelvic Inflammatory Disease)	
General Practice	
General Practice	PHCC Official Statistics
Oral Care and Cancer	
Dental cleaning and preventive care	PHCC Official Statistics

**Table S7. References and assumptions used to estimate the total number of services delivered in 2019 in UAE**

Immunization	WHO-UNICEF Estimates 2019 <sup>11</sup>
Rotavirus vaccine	
Measles vaccine	
DPT vaccine	
Hib vaccine	
Hep B vaccine	
Polio vaccine	
BCG vaccine	
Pneumococcal vaccine	

HPV vaccine	HPV Information Centre <sup>12</sup>	
Influenza vaccine	Assumption derived from Bahrain	
Non-Communicable Diseases		
CVD & Diabetes		
Screening for risk of CVD/Diabetes	Assumption: 5.0%	
Follow-up care for those at low risk of CVD/Diabetes (Absolute Risk: 10-20%)	Assumption: 5.0%	
Treatment for those with very high cholesterol but low absolute risk of CVD/Diabetes (< 20%)	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>2</sup>	
Treatment for those with high blood pressure but low absolute risk of CVD/Diabetes (< 20%)		
Treatment for those with absolute risk of CVD/Diabetes 20-30%		
Treatment for those with high absolute risk of CVD/Diabetes (>30%)		
Treatment of new cases of acute myocardial infarction (AMI) with aspirin		
Treatment of cases with established ischaemic heart disease (IHD)		
Treatment for those with established cerebrovascular disease and post stroke		
Treatment of cases with rheumatic heart disease (with benzathine penicillin)		
Standard glycaemic control		Estimate from OneHealth Tool <sup>7</sup> and Dubai Government Annual Health Statistics Book 2019 <sup>13</sup>
Intensive glycaemic control		
Retinopathy screening		
Neuropathy screening and preventive foot care		
Breast Cancer		
Basic breast cancer awareness	Assumption: 5.0%	
Screening: Clinical Breast Examination	Estimate from Bahrain	
Screening: Mammography	Assumption: 0.9%	
Diagnosis after Screened with Clinical Breast Exam	Estimation from WHO IARC 2020 <sup>3</sup>	
Diagnosis after Screened with Mammography		
Diagnosis without screening for breast cancer		
Cervical Cancer		
Visual inspection with acetic acid (VIA)	Assumption: 5.0%	
Papanicolaou test (Pap smear)	Assumption: 9.3%	
HPV DNA + VIA	Assumption: 5.0%	
Colorectal Cancer		
Screening: faecal immunochemical test	Assumption : 0.5%	
Screening: faecal occult blood testing		
Diagnosis for colorectal cancer screened with FIT	Assumption: 100%	
Diagnosis for colorectal cancer screened with FOBT		
Diagnosis without screening for colorectal cancer (symptom based)		
Respiratory Disease		
Asthma: Inhaled short acting beta agonist for intermittent asthma	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>3</sup>	
Asthma: Low dose inhaled beclomethasone + SABA		

Asthma: High dose inhaled beclomethasone + SABA	
COPD: Smoking cessation	
COPD: Inhaled salbutamol	
COPD: Ipratropium inhaler	
COPD: exacerbation treatment with antibiotics	
COPD: exacerbation treatment with oral prednisolone	
COPD: exacerbation treatment with oxygen	
Emergency care	
Average annual emergency care needs	N/A
Oral Care	
Oral and dental care	Estimate from Dubai Government Annual Health Statistics Book <sup>13</sup>
Child Health	
General Health (Children)	
General Health (Children)	Assumption: 25% of GP visits
Diarrhea management	
ORS	
Antibiotics for treatment of dysentery	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Pneumonia	
Pneumonia treatment (children)	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Routine Child Health Care Visit	
Routine Child Health Care Visit (< 1 year)	
Routine Child Health Care Visit (1-5 years)	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Nutrition	
Adults	
Care for Obese adults	
Care for Diabetic adults	
Care for adults with hyperuricemia	
Care for adults with kidney diseases	
Care for adults with nutritional anaemia	
Care for adults with food allergies and sensitivities	Assumption: 5.0%
All populations	
Food fortification	Assumption: 100%
Children	
Management of severe malnutrition	
Management of moderate acute malnutrition	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Management of Food allergies or Food intolerances	Assumption: 5.0%
Mental Health	
Anxiety Disorders	
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>

Basic psychological treatment for anxiety disorders (mild cases).	
Depression	
Basic psychosocial treatment for mild depression	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Basic psychosocial treatment and anti-depressant medication of first episode moderate-severe cases	
Intensive psychosocial treatment and anti-depressant medication of recurrent moderate-severe cases on a maintenance basis	
Psychological care for peri-natal	
Psychosis	
Basic psychosocial support and anti-psychotic medication	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Bipolar Disorders	
Basic psychosocial treatment, advice, and follow-up for bipolar disorder, plus mood-stabilizing medication	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Epilepsy	
Basic psychosocial support, advice, and follow-up, plus anti-epileptic medication	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Developmental Disorders	
Basic psychosocial treatment, advice, and follow-up for developmental disorders	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Conduct Disorders	
Basic psychosocial treatment, advice, and follow-up for behavioural disorders	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Attention Disorders	
Methylphenidate medication	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Dementia	
Assessment, diagnosis, advice, and follow-up for dementia	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Pharmacological treatment of dementia	
Alcohol Use/Dependence	
Identification and assessment of new cases of alcohol use/dependence	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Drug Use/Dependence	
Brief interventions and follow-up for drug use/dependence	Estimate from Abu Dhabi Government Annual Health Statistics <sup>14</sup>
Maternal Newborn and Reproductive Health	
Preconception Care (PCC)	
Preconception Care (PCC)	Assumption derived from UHC Service Coverage Sub-Index on MNCH (WHO) <sup>2</sup>
Antenatal Care (ANC)	
Antenatal Care (ANC)	Assumption: 99% ANC Coverage
Postnatal Care (PNC)	
Postnatal Care (PNC)	Assumption derived from UHC Service Coverage Sub-Index on MNCH (WHO) <sup>2</sup>
Premarital screening program	
Premarital screening program	Assumption: 100%
General Practice	
General Practice	Estimate from Dubai Government Annual Health Statistics Book <sup>13</sup>

**Table S8. References and assumptions used to estimate the total number of services delivered in 2019 in KSA**

Immunization	
Measles vaccine	MOH Statistical Yearbook 2019 <sup>15</sup>
Pentavalent vaccine	
Varicella vaccine	Estimate from MOH Statistical Yearbook 2019 <sup>15</sup>
Polio vaccine	MOH Statistical Yearbook 2019 <sup>15</sup>
BCG vaccine	
Rubella vaccine	
Pneumococcal vaccine	
HPV vaccine	Assumption: 5.0%
Non-Communicable Diseases	
CVD & Diabetes	
Screening for risk of CVD/Diabetes	Assumption: 5.0%
Follow-up care for those at low risk of CVD/Diabetes (Absolute Risk: 10-20%)	Assumption: 5.0%
Treatment for those with very high cholesterol but low absolute risk of CVD/Diabetes (< 20%)	Estimate from MOH Statistical Yearbook 2019 <sup>15</sup>
Treatment for those with high blood pressure but low absolute risk of CVD/Diabetes (< 20%)	
Treatment for those with absolute risk of CVD/Diabetes 20-30%	
Treatment for those with high absolute risk of CVD/Diabetes (>30%)	
Treatment of new cases of acute myocardial infarction (AMI) with aspirin	
Treatment of cases with established ischaemic heart disease (IHD)	
Treatment for those with established cerebrovascular disease and post stroke	KSA World Health Survey <sup>16</sup>
Treatment of cases with rheumatic heart disease (with benzathine penicillin)	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>2</sup>
Standard glycaemic control	Estimate from MOH Statistical Yearbook 2019 <sup>15</sup>
Intensive glycaemic control	
Neuropathy screening and preventive foot care	
Breast Cancer	
Basic breast cancer awareness	Assumption: 5.0%
Screening: Clinical Breast Examination	Assumption derived from Bahrain
Screening: Mammography	KSA World Health Survey <sup>16</sup>
Diagnosis: Screened with clinical breast exam	Estimate from WHO IARC 2020 <sup>3</sup>
Diagnosis: Screened with mammogram	
Post-treatment surveillance for breast cancer patients	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>2</sup>
Cervical Cancer	
Papanicolaou test (Pap smear)	KSA World Health Survey <sup>16</sup>
Post treatment surveillance for cervical cancer	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>2</sup>
Colorectal Cancer	

Screening: faecal occult blood testing	Estimate from Aljumah and Aljebreen (2017) <sup>17</sup>
Screening: Sigmoidoscopy	
Screening: Colonoscopy	
Diagnosis for colorectal cancer screened with FOBT	Estimation from WHO IARC 2020 <sup>3</sup>
Diagnosis without screening for colorectal cancer (symptom based)	
Post treatment surveillance for colorectal cancer	Assumption derived from UHC Service Coverage Sub-Index on NCDs (WHO) <sup>2</sup>
Respiratory Disease	Estimate from MOH Statistical Yearbook 2019 <sup>15</sup>
Asthma: Inhaled short acting beta agonist for intermittent asthma	
Asthma: Low dose inhaled fluticasone + SABA	
Asthma: High dose inhaled fluticasone + SABA	
Asthma: Theophylline + High dose inhaled fluticasone + SABA	
Asthma: Oral Prednisolone + Theophylline + High dose inhaled fluticasone + SABA	
COPD: Smoking cessation	
COPD: Inhaled salbutamol	
COPD: Low-dose oral theophylline	
COPD: Ipratropium inhaler	
COPD: exacerbation treatment with antibiotics	
COPD: exacerbation treatment with oral prednisolone	
COPD: exacerbation treatment with oxygen	
Emergency care	N/A
Average annual emergency care needs	
Child Health	MOH Statistical Yearbook 2019 <sup>15</sup>
General	
General Health (Children)	
Zinc supplementation	
Diarrhea management	
ORS	
Zinc (diarrhea treatment)	
Antibiotics for treatment of dysentery	
Treatment of severe diarrhea	
Pneumonia	
Pneumonia treatment (children, mild cases)	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Treatment of severe pneumonia	
Nutrition	Estimate from Alreshidi et al. (2018) <sup>18</sup>
Women of reproductive age and adolescent girls	
Intermittent iron-folic acid supplementation	
Pregnant and lactating women	
Daily iron and folic acid supplementation (pregnant women)	
Intermittent iron and folic acid supplementation (non-anaemic pregnant women)	Estimate from Al-Duraibi and Am-Mutawa (2020) <sup>19</sup>

Vitamin A supplementation in pregnant women	Estimate from Azzeah and Refaat (2020) <sup>20</sup>
Iodine supplementation in pregnant women	
Adults	
Care for adults with low BMI	Assumption derived from Bahrain
Children	
Breastfeeding counselling and support	Assumption derived from Service Coverage Sub-Index on MNCH (WHO) <sup>2</sup>
Complementary feeding counselling and support	
Management of moderate acute malnutrition (children)	Assumption derived from UHC Service Coverage Index (WHO) <sup>2</sup>
Mental Health	
Anxiety disorders	
Basic psychosocial treatment for anxiety disorders (mild cases)	Assumption: 1.0%
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)	
Depression	
Basic psychosocial treatment for mild depression	Assumption: 1.0%
Basic psychosocial treatment and anti-depressant medication of first episode moderate-severe cases	
Psychosocial care for peri-natal depression	
Psychosis	
Basic psychosocial support and anti-psychotic medication	Assumption: 1.0%
Bipolar disorder	
Basic psychosocial treatment, advice, and follow-up for bipolar disorder, plus mood-stabilizing medication	Assumption: 1.0%
Epilepsy	
Basic psychosocial support, advice, and follow-up, plus anti-epileptic medication	Assumption: 1.0%
Developmental disorders	
Basic psychosocial treatment, advice, and follow-up for developmental disorders	Assumption: 1.0%
Conduct disorders	
Basic psychosocial treatment, advice, and follow-up for behavioural disorders	Assumption: 1.0%
Dementia	
Assessment, diagnosis, advice, and follow-up for dementia	Assumption: 1.0%
Alcohol use/dependence	
Identification and assessment of new cases of alcohol use/dependence	Assumption: 1.0%
Brief interventions and follow-up for alcohol use/dependence	
Drug use/dependence	
Identification and assessment of new cases of drug use/dependence	Assumption: 1.0%
Brief interventions and follow-up for drug use/dependence	
Self-harm/suicide	
Assess and care for person with self-harm	Assumption: 1.0%
Maternal Newborn and Reproductive Health	
Family planning	



Pill - Standard daily regimen	KSA World Health Survey <sup>16</sup>
IUD - Copper-T 380-A IUD (10 years)	
Withdrawal	
Pregnancy care - ANC	
Tetanus toxoid (pregnant women)	Estimate from KSA World Health Survey <sup>16</sup>
Basic ANC	
Pregnancy care - Treatment of pregnancy complications	
Hypertensive disorder case management	Assumption: 100%
Childbirth care - Facility births	
Pre-referral management of labour complications	Assumption: 100%
Postpartum care - Other	
Treatment of postpartum haemorrhage	Assumption: 100%
Other sexual and reproductive health	
Treatment of urinary tract infection (UTI)	Assumption derived from UHC Service Coverage Sub-Index on MNCH (WHO) <sup>2</sup>
Treatment of syphilis	
Treatment of gonorrhoea	
Treatment of chlamydia	
Treatment of trichomoniasis	
Treatment of PID (Pelvic Inflammatory Disease)	
General Practice	
General Practice	MOH Statistical Yearbook 2019 <sup>15</sup>
Oral Care	
Dental cleaning and preventive care	MOH Statistical Yearbook 2019 <sup>15</sup>

## References

1. Sultanate of Oman Ministry of Health. Annual Health Report 2019, 2020.
2. World Health Organization. The Global Health Observatory, 2023.
3. International Agency for Research on Cancer. Global Cancer Observatory. Cancer Today.
4. Ministry of Health of Bahrain. Health Statistics 2019, 2021.
5. United Nations DoEaSA, Population Division,. Contraceptive Use by Method 2019: Data Booklet (ST/ESA/SER.A/435), 2019.
6. Ministry of Health of Kuwait. Annual Health Report 2019. Fifty Sixth Edition (LVI), 20220.
7. Avenir Health. OneHealth Tool. Intervention Assumptions, January 2016.
8. Qatar Planning and Statistics Authority. Health Services Statistics - Chapter 6 2019 [Available from: <https://www.psa.gov.qa/en/statistics1/pages/topicslisting.aspx?parent=Social&child=Health> accessed 24/01/2022 2022.
9. The World Bank. World Bank Open Data, 2022.
10. Zainel A, Osman SRO, Al-Kohji SMS, et al. Iron deficiency, its epidemiological features and feeding practices among infants aged 12 months in Qatar: a cross-sectional study. *BMJ Open* 2018;8(5):e020271. doi: 10.1136/bmjopen-2017-020271 [published Online First: 20180509]
11. World Health Organization and United Nations Children's Fund. WHO/UNICEF estimates of national immunization coverage 2022 [Available from: <https://www.who.int/teams/immunization-vaccines-and-biologicals/immunization-analysis-and-insights/global-monitoring/immunization-coverage/who-unicef-estimates-of-national-immunization-coverage> accessed 06/03/2022.
12. ICO/IARC HPV Information Centre. United Arab Emirates. Human Papillomavirus and Related Cancers, Fact Sheet 2019. 2019
13. Government of Dubai. Open Data Dashboards. Departement of Health 2022 [Available from: <https://www.dha.gov.ae/en/open-data> accessed 04/03/2022.
14. Government of Abu Dhabi. Open Data Dashboards. Departement of Health 2022 [Available from: <https://www.doh.gov.ae/en/resources/opendata> accessed 04/03/2022.
15. Ministry of Health of the Kingdom of Saudi Arabia. Statistical Yearbook 2019. Chapter IV. Health Activities 2021 [Available from: <https://www.moh.gov.sa/en/Ministry/Statistics/book/Pages/default.aspx>.
16. Ministry of Health of the Kingdom of Saudi Arabia. World Health Survey Saudi Arabia 2019. Final Report., 2019.
17. Aljumah AA, Aljebreen AM. Policy of screening for colorectal cancer in Saudi Arabia: A prospective analysis. *Saudi J Gastroenterol* 2017;23(3):161-68. doi: 10.4103/sjg.SJG\_468\_16
18. Alreshidi MA, Haridi HK. Prevalence of anemia and associated risk factors among pregnant women in an urban community at the North of Saudi Arabia. *J Prev Med Hyg* 2021;62(3):E653-e63. doi: 10.15167/2421-4248/jpmh2021.62.3.1880 [published Online First: 20210915]
19. AlDuraibi S, Al-Mutawa J. Knowledge and awareness of folic acid usage in Saudi pregnant women in Riyadh city from 2019-2020. *J Family Med Prim Care* 2020;9(10):5158-64. doi: 10.4103/jfmpc.jfmpc\_638\_20 [published Online First: 20201030]
20. Azzeh F, Refaat B. Iodine adequacy in reproductive age and pregnant women living in the Western region of Saudi Arabia. *BMC Pregnancy Childbirth* 2020;20(1):370. doi: 10.1186/s12884-020-03057-w [published Online First: 20200622]