

Costing the National Strategic Plan on Prevention and Control of Cervical Cancer: Mongolia, 2020–2024

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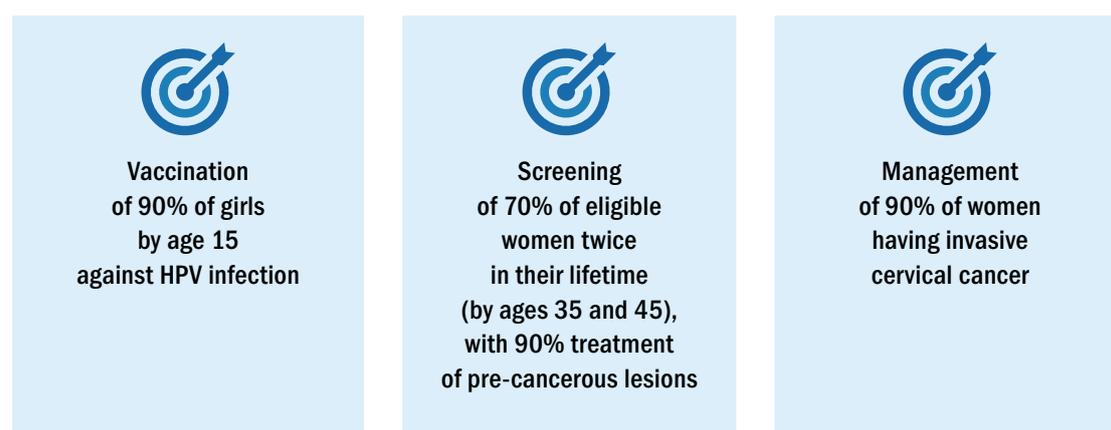
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CONSIDERATIONS FOR PLANNING ELIMINATION OF CERVICAL CANCER AS A PUBLIC HEALTH PROBLEM

The Mongolian government is committed to reducing the burden of cervical cancer through its National Cervical Cancer Prevention and Control Plan. This current costing exercise, which began in 2018, assists in the implementation of the Plan. Based on the costing exercise, the results of which are summarized below, several points may be noted.

- 1 While the National Cervical Cancer Prevention and Control Plan for Mongolia had been developed before the specific global targets for cervical cancer elimination were formulated, Mongolia's targets for a future Plan might take the 2030 targets of the elimination strategy into consideration (Fig. 1). Increasing existing capacity and resources required to meet future targets should be taken in to consideration – notably, availability and access to cancer treatments, which would likely need to be extended beyond the current single cancer treatment center in the country.

Fig. 1. Targets of the Global Strategy towards Eliminating Cervical Cancer as a Public Health Problem



HPV: human papillomavirus.

Source: World Health Organization (2020) (1).

② Considerable investment is proposed to expand pre-cancer treatment loop electrosurgical excision procedure (LEEP) services outside of the capital region with the goal of expanding access and overall total capacity. Ablative treatment methods, such as cryotherapy and thermal ablation, may facilitate further expansion of treatment services, including at lower-level facilities while also offering potential cost and time savings for women who are eligible for ablation. The government has indicated that thermal ablation may be introduced in the near future, and a wider adoption of ablative treatment would be worth serious consideration going forward.

③ A detailed costing was out of scope for this project. The results presented in this summary report present a broad estimate of direct costs associated with implementing the plan. Additionally, economic costs (such as the cost of provider time diverted from other work to the cervical cancer programme, volunteer work, or any subsidized amount) are not included, as the OneHealth Tool does not take these into consideration. However, economic costs are important to consider for resource allocation and operational planning. Furthermore, some input costs were taken from the tool's global default values when local costs were not available. A more detailed costing study that includes both financial and economic costs is recommended if resources allow it.

BACKGROUND

Mongolia has the highest incidence rate of cervical cancer in Asia, with an estimated 23.5 cases per 100,000 women (2). An estimated 370 women were diagnosed with cervical cancer and 150 died from the disease in 2018 (2), as many cancers are diagnosed at an advanced stage (3). This made cervical cancer the second most common cancer for women in Mongolia in 2018, following only liver cancer (2). In a national reproductive health survey carried out in 2008, only 29.7% of Mongolian women ages 15 to 49 reported having been screened for cervical cancer at least once in their lives (2).

The most recent National Cancer Control Plan (3) covered the 2007–2017 period and included several key interventions focused on cervical cancer control initiatives, including:

- **Primary prevention** through health education targeted at both women and men and consideration of including human papillomavirus (HPV) vaccine in routine vaccination programmes for young girls;
- **Secondary prevention** by screening women aged 30–60 years using visual inspection with acetic acid (VIA) and treatment of pre-cancerous lesions with LEEP;
- **Treatment** of invasive cervical cancer at the National Cancer Center.

The 2007 national budget allocated approximately US\$ 210,000 for raising awareness of cervical cancer as well as strengthening capacity for cytology, pathology and colposcopy at the National Cancer Center.

Table 1. Overview of cervical cancer disease burden

Cervical Cancer Age-standardized Incidence Rate in 2018 ^a	23.5 per 100,000 women
Cervical Cancer Age-standardized Mortality Rate in 2018 ^a	10.2 per 100,000 women
HPV Prevalence (females aged 15–49, capital region) ^b	35%
HIV Prevalence (females aged 15–49) ^c	<0.1%

HPV: human papillomavirus; HIV: human immunodeficiency virus.

Sources: ^aInternational Agency on Research for Cancer (2018) (2). ^bDondog B, Clifford GM (2008) (4). ^cUNAIDS (2020) (5).

Resulting from a collaboration between the Mongolia Ministry of Health and the World Health Organization (WHO), here we provide a summary report of the 5-year (2020–2024) National Cervical Cancer Prevention and Control Plan in terms of financial costs from the public provider perspective. Financial costs (also referred to as “bookkeeping costs”) are the value of resources to the Ministry of Health and include the cost of actual resources purchased to develop and implement the national programme and involve actual monetary payments (or expenditures). The majority of costs were calculated using the OneHealth Tool. Supplemental costs of service provision and annualized equipment purchase, which are not captured in the OneHealth Tool, were calculated manually. All costs are reported in 2019 United States (US) dollars. The OneHealth Tool is a planning aid and provides globally standardized input quantities and costs for recommended cancer control interventions. Users may also enter local data, but as a detailed costing study for Mongolia was outside the scope of this report, most unit costs used in this report are default values included in the OneHealth Tool. Technical notes on costing methodology can be found in the [Annex](#).

INTERVENTIONS

PRIMARY PREVENTION – HPV Vaccination

HPV vaccination has not yet been included in the routine immunization programme. With a DTP-3 coverage of 99% in 2018 (6), opportunities exist to leverage the existing immunization system to implement HPV vaccination coverage in the country.

Mongolia plans to achieve a total HPV vaccination coverage rate of 74%, fully immunizing over 129,000 11-year-old girls over the 2020–2024 period. 70% of immunizations are assumed to occur at primary schools. The other 30% of girls will be reached either in health facilities (10%) or through outreach campaigns (20%). Mongolia will achieve this coverage at a cost of US\$ 31.10 per fully immunized girl (FIG). The total cost to support the introduction and roll out of the HPV vaccine in Mongolia over the 2020–2024 period is estimated at US\$ 4 million. This includes the cost of the vaccine at the Gavi-subsidized price of US\$ 4.50 per dose.

Table 2. Costing summary of HPV vaccination

	2020	2021	2022	2023	2024	2020–2024
Target vaccination coverage	74%	74%	74%	74%	74%	N/A
Number of FIGs per year	24,800	23,500	25,400	27,100	28,800	129,700
Financial cost per FIG (US\$)	33.63	32.81	30.62	29.95	29.02	31.10*

HPV: human papillomavirus; FIG: fully immunized girl.

* Average cost per FIG over 5 years, calculated as (total cost from years 1–5)/(number of FIGs from years 1–5).

Note: costs reported in 2019 United States dollars (US\$).

SECONDARY PREVENTION – Screening and Pre-cancer Treatment

Mongolia will rely on HPV DNA testing for primary screening with Pap smear for triage after positive screening results. LEEP will be available for treatment of pre-cancerous lesions, and women with signs of invasive cervical cancer will be referred for tertiary care.

Between 2020 and 2024, Mongolia will provide 474,990 screenings with HPV DNA tests, attaining a 48% national coverage rate of women age 30–60 in 2024. An estimated 23,258 Pap smears will be conducted as triage. All eligible women will be screened every three years regardless of HIV status.

80% of screenings will be conducted in health facilities, while the remaining 20% will be conducted through outreach campaigns. We estimate that HPV DNA test primary screens will cost US\$ 22.28 per service and triage with Pap smear will cost \$13.07 per service. This comes to an average cost of US\$ 22.92 per woman for both primary screening and triage. Service delivery costs include the annualized cost of HPV test readers purchased (assuming a useful life of five years). The total cost of screening and triage is expected to be US\$ 10.9 million over the 2020–2024 period.

For women with abnormal Pap smear triage results, 84% coverage with LEEP will be achieved each year. The cost of LEEP in Mongolia is estimated at US\$ 22.23 per treatment. Service delivery costs include the annualized cost of LEEP machines (assuming a useful life of five years). The total cost of pre-cancerous lesion treatment is expected to total US\$ 266,0867 over the 2020–2024 period.

Table 3. Costing summary of screening and pre-cancer treatment

	2020	2021	2022	2023	2024	2020–2024
Target initial screening coverage	37%	39%	42%	45%	48%	N/A
Number of HPV DNA tests provided	79,702	86,077	94,619	103,100	111,492	474,990
Number of Pap smear triage tests provided	3,917	4,280	4,642	4,999	5,420	23,258
Average financial cost per screening service provided (US\$)	23.18	23.07	22.93	22.81	22.72	22.92
Number of pre-cancer treatment performed	2,303	2,360	2,408	2,449	2,483	12,004
Financial cost per pre-cancer treatment performed (US\$)	22.44	22.32	22.22	22.13	22.07	22.23

HPV: human papillomavirus; DNA: deoxyribonucleic acid.
Note: costs reported in 2019 United States dollars (US\$).

TERTIARY PREVENTION – Cancer Diagnosis, Treatment and Palliative Care

Mongolia plans to offer tertiary care to treat patients diagnosed with cervical cancer. The total cost for tertiary prevention over 5 years, excluding programme support activity costs, will be US\$ 9.5 million.

Table 4. Costing summary of cancer diagnosis, treatment and palliative care

	Stage I	Stage II	Stage III	Stage IV	Post-treatment surveillance	Basic palliative care	Extended palliative care
Target coverage in 2024	9%	18%	42%	10%	49%	18%	1%
Number of services provided in 5 years	601	471	2,746	180	1,770	461	1
Financial Cost per service (US\$)	586.33	2290.35	2334.77	2334.77	137.21	2068.88	711.74

Note: costs reported in 2019 United States dollars (US\$).

PROGRAMME SUPPORT ACTIVITIES COSTS – Secondary and Tertiary Prevention

Additional programme support activities cost for supporting activities like microplanning, training, social mobilization, and supervision will require a financial expenditure of US\$ 5.1 million over the 2020–2024 period.

COSTING SUMMARY

We estimate the total cost of national cervical cancer prevention and control activities in Mongolia for the years 2020–2024 to be US\$ 29.8 million. Total costs rise gradually over time, reflecting the steady increases in coverage of screening and triage services planned for the 5-year period. Of the total, 14% will be for vaccination (including programme support activities costs), 37% for service delivery of screening and pre-cancer treatment, and 32% for service delivery of cancer diagnosis, treatment and palliative care while the remaining 17% will be for programme support activities costs of secondary and tertiary prevention.

Table 5. Summary of total financial costs of the national response by programme areas and by years

Programme Areas	2020	2021	2022	2023	2024	Total
Costs of HPV Vaccination (including Programme Support Activities Costs) (million US\$)	0.8	0.8	0.8	0.8	0.8	4.0
Service Delivery Costs of Screening and Pre-cancer Treatment (million US\$)	1.9	2.0	2.2	2.4	2.6	11.2
Service Delivery Costs of Cancer Diagnosis, Treatment and Palliative Care (million US\$)	1.5	1.8	1.9	2.0	2.2	9.5
Programme Support Activities Costs of Secondary and Tertiary Prevention (million US\$)	1.0	1.0	1.0	1.0	1.0	5.1
Total	5.3	5.7	5.9	6.2	6.7	29.8

HPV: human papillomavirus.

Note: costs reported in 2019 United States dollars (US\$).

Fig. 2. National response by programme areas over five years (financial cost)

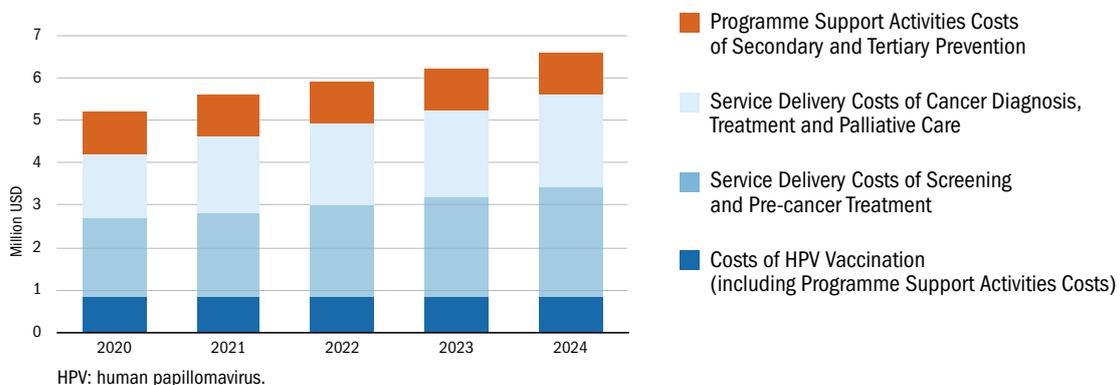


Table 6. Overall summary of Mongolia’s National Strategic Plan on Prevention and Control of Cervical Cancer, 2020–2024 (five-year totals and averages)

TOTAL COST OVER FIVE YEARS	
Total financial cost of National Strategic Plan over five years	US\$ 29,782,695
HPV VACCINATION	
Delivery strategy and interventions	<ul style="list-style-type: none"> • Administration of a 2-dose vaccine to be delivered to 11-year-old girls • 70% of girls to be vaccinated at schools, others to be vaccinated at outreaches or health facilities
Target coverage	74%
Number of FIGs	129,707
Cost per FIG (financial)	US\$ 31.10
Total cost (financial)	US\$ 4,033,652 (including programme support activities costs)
SCREENING & TRIAGE	
Delivery strategy and interventions	<ul style="list-style-type: none"> • HPV DNA tests, with Pap smears for women who are HPV positive • 80% of screenings will be done in health facilities, 20% through outreach campaigns
Target coverage	Rising from 37% in 2020 to 48% in 2024
Number of services provided	474,990 – HPV DNA screens 23,258 – triage Pap smears
Average cost per service (financial)	US\$ 22.92
Total service delivery cost (financial)	US\$ 10,887,272 (including the cost of purchasing HPV test readers, but excluding programme support activities costs)
PRE-CANCER TREATMENT	
Delivery strategy and interventions	Women with abnormal Pap smear results will be treated with LEEP
Target coverage	84%
Number of services provided	12,004
Cost per service (financial)	US\$ 22.23
Total service delivery cost (financial)	US\$ 266,867 (including the cost of purchasing LEEP machines, but excluding programme support activities costs)

CANCER DIAGNOSIS, TREATMENT AND PALLIATIVE CARE	
Delivery strategy and interventions	One cancer center available with 311 beds, which is sufficient to cover the cervical cancer cases at the targeted coverage rates for treatment
Target coverage in 2024	9% – stage I 18% – stage II 42% – stage III 10% – stage IV 49% – post treatment surveillance 18% – basic palliative care 1% – extended palliative care
Number of services provided	3,999 – treatment of cancer stages I–IV 1,770 – post treatment surveillance 461 – basic palliative care 1 – extended palliative care
Cost per service (financial)	US\$ 586.33 – stage I US\$ 2,290.35 – stage II US\$ 2,334.77 – stage III US\$ 2,334.77 – stage IV US\$ 137.21 – post treatment surveillance US\$ 2,068.88 – basic palliative care US\$ 711.74 – extended palliative care
Total service delivery cost (financial)	US\$ 9,460,794 (excluding programme support activities costs)
PROGRAMME SUPPORT ACTIVITIES COSTS	
Total programme support activities costs for screening, pre-cancer treatment, and cancer diagnosis, treatment, and palliative care (financial)	US\$ 5,134,110

FIG: fully immunized girl; HPV: human papillomavirus; DNA: deoxyribonucleic acid; LEEP: loop electrosurgical excision procedure.
Note: costs reported in 2019 United States dollars (US\$).

ASSUMPTIONS AND LIMITATIONS

The analysis presented in this report represents a prospective costing of implementing the 2020–2024 National Cervical Cancer Prevention and Control Plan in Mongolia, and thus does not take into account any current observed costs and is not intended to show actual expenditures or capacity. Local estimates from government sources of costs and other inputs were used as much as possible, but some locally-specific inputs were not available, in which case global default values from the OneHealth Tool were used. The scope of this analysis is limited to public health system planning of cervical cancer prevention and treatment services, which presents an indicative picture of direct expenditures resources required to carry out a programme but does not extend into ancillary services or equipment such as ambulances, cost of patients' time, insurance, etc. The OneHealth Tool does not estimate additional economic costs, the value of resources that are already in place in the health-care system and are diverted for the programme such as volunteer time, donations, or subsidies—that is, expenditures made by parties other than the national government. The Tool was built to support planning processes across the entire healthcare system and therefore is structurally limited in modelling cervical cancer care as compared to a purpose-built tool. Finally, as with any planning tool there is a level of uncertainty inherent in the results, which should be considered as estimates and not exact values.

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ANNEX

Technical note on the costing methodology using the OneHealth Tool

The OneHealth Tool (OHT) was developed to support national strategic health planning in low- and middle-income countries. In the tool costs are categorized into direct medical costs, which include items directly used in the intervention such as medical supplies and drugs, personnel, and the per-service cost of using medical equipment (which does not include any capital purchases required), or programme support activities cost, which include programme management and supporting activities such as training, communication, outreach, advocacy, supervision, and monitoring and evaluation.

In order to more fully capture costs and to strengthen the comparability of this costing report with others that have utilized the WHO Cervical Cancer Prevention and Control Costing (C4P) tool, supplemental costs for service delivery as well as the annualized cost of equipment purchases were calculated manually in Excel. These were added to the outputs from the OHT, as the OHT does not have the capacity to incorporate them automatically.

The FIG was calculated as the sum of the direct medical costs of vaccines and supplies plus total programme support activities cost plus supplemental costs of service delivery, which is then divided by the total number of fully immunized girls. Direct medical costs and programme support activities cost were calculated in the OHT using the Gavi vaccine price of US\$ 4.50 and OHT default costs for other supplies. Programme support activities costs were given by the Mongolian National Cancer Center and Ministry of Health and are specific to Mongolia. The supplemental costs of service delivery were calculated manually by multiplying the cost to deliver one vaccine dose by the number of vaccine doses administered, with the service delivery cost specific to Mongolia and varied by delivery setting (school, outreach, or facility-based outpatient visit).

For screening services at clinics or hospitals, supplemental costs for service delivery were calculated by multiplying the number of outpatient or inpatient days per service (using the default number of days from the OHT) by the average cost of an outpatient or inpatient visit, respectively, in Mongolia as per a ministerial order from the Ministry of Finance and Ministry of Health. The annualized cost of medical equipment purchases was then added to the outpatient or inpatient costs. For outreach screening services, these supplemental costs were calculated by multiplying the number of outpatient days (from OHT defaults) by the sum of the average cost of an outpatient visit plus the average cost per screen (which takes into account transport and per diem costs). The annualized cost of medical equipment purchases (which in this report includes HPV test readers and LEEP machines) was calculated by multiplying the unit cost by the total number of units to be purchased, then dividing by the

equipment useful lifespan in years. The unit cost of a HPV test reader was estimated at US\$ 21,234 (provided by the Mongolian Ministry of Health Public Health Department), and the unit cost of a LEEP machine was estimated at US\$ 2,700 (estimated average cost of LEEP devices on the market).

Costs are expressed as financial costs, which estimate the actual monetary expenditures of the buyer and do not include the value of resources already paid for such as personnel time and donated goods. All costs provided in Mongolia tugrik were converted to US dollars at the 2019 Bank of Mongolia exchange rate of 2,576 MNT to 1 USD. Details on relevant technical aspects of the OHT can be found on the Avenir Health website: <https://www.avenirhealth.org/software-onehealth.php>.

