Cost Effectiveness of HPV vaccine in Guyana

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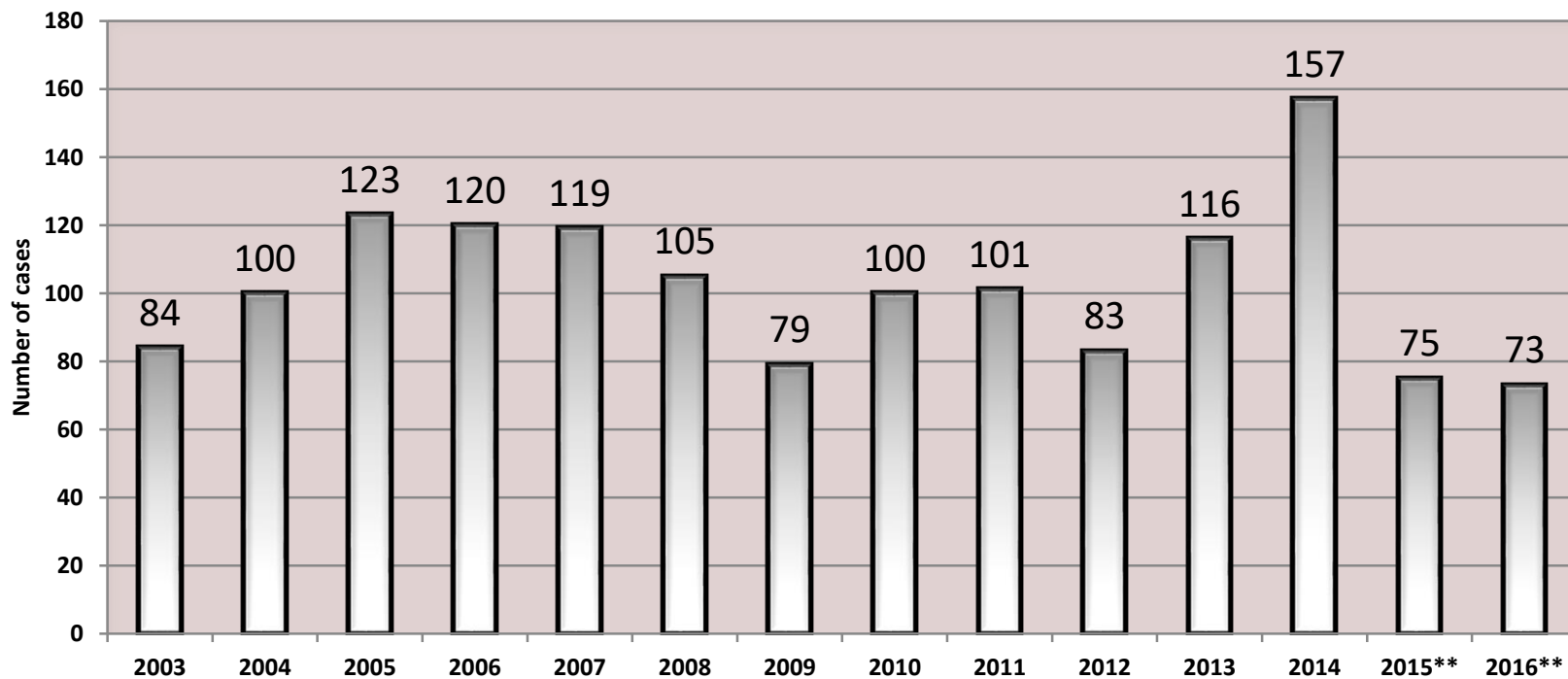**MINISTRY OF PUBLIC HEALTH**

OUTLINE

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Guyana has a population of 272,382 women ages 15 years and older who are at risk of developing cervical cancer. Current estimates indicate that on average in any given year 44 % of the of the total women diagnosed with the cervical cancer will die from the disease("Guyana- Human Papillomavirus and Related Cancers Fact Sheet," 2017).

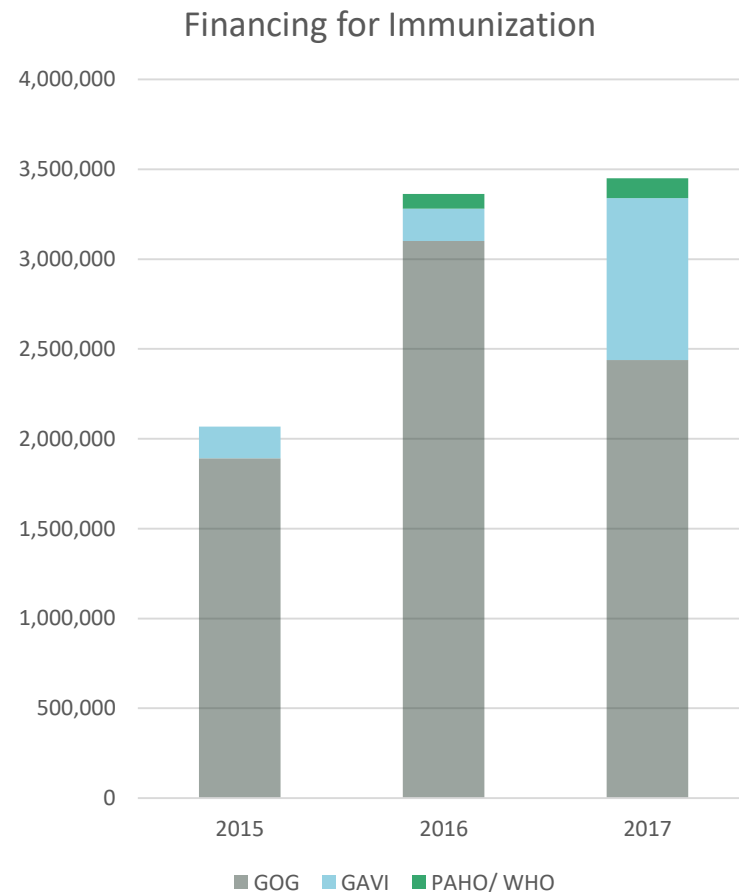Number of Cervical Cancers Diagnosis in Guyana (2003 to 2016)
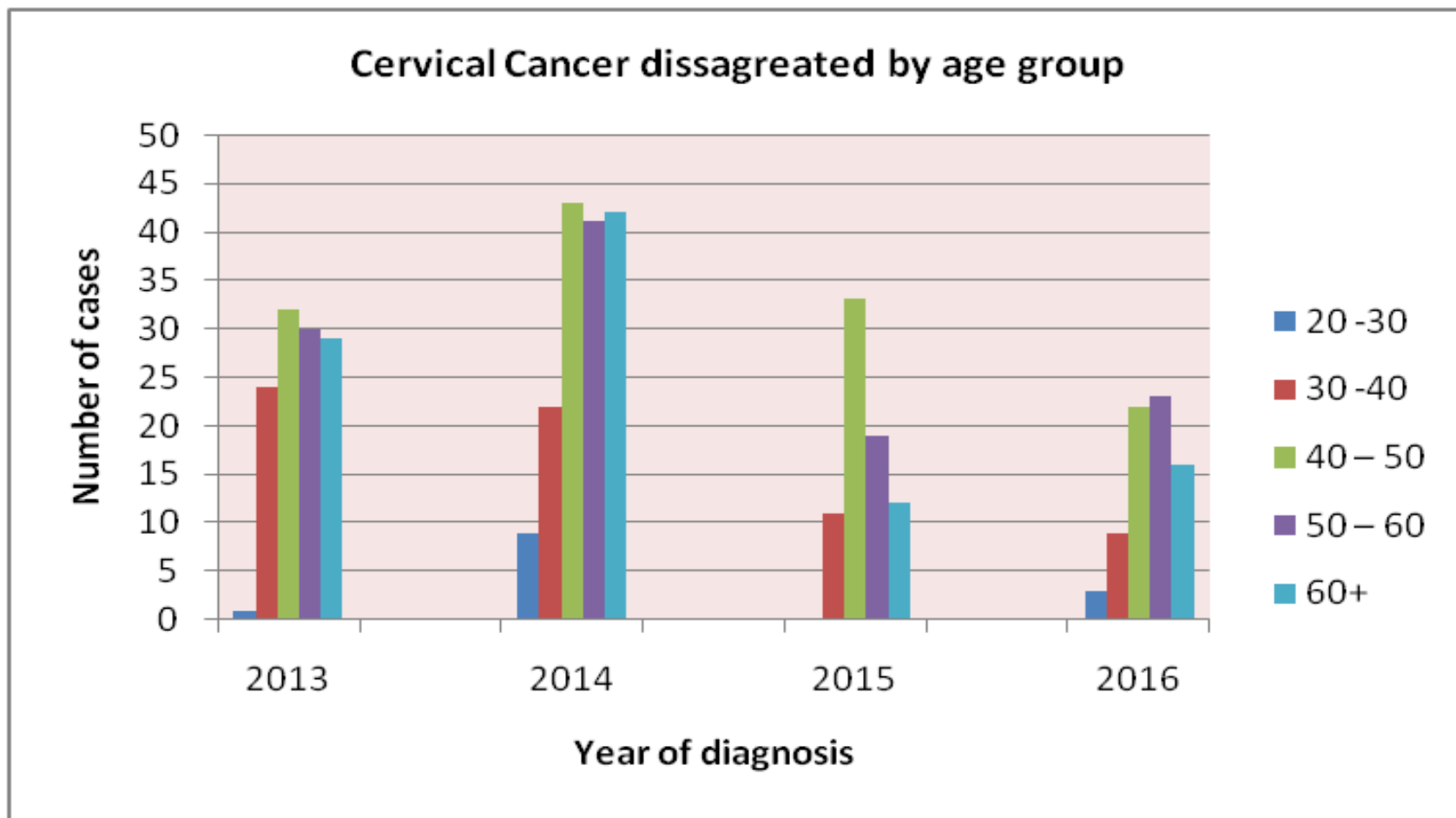
Distribution of cancer case between 2013 to 2016 by age group.

The Expanded Programme for Immunization (EPI)I in Guyana is managed by the Ministry of Public Health and falls within the Maternal & Child Health Department

The EPI procures vaccines through the PAHO Revolving Fund

With an established EPI programme (fiscal space in National Budget) there is the assurance that the government will continue to provide funding for any new vaccine that is introduced

Financing for Immunization

Bar chart showing Financing for Immunization for 2015, 2016, and 2017, with funding sources GOG (grey), GAVI (light blue), and PAHO/ WHO (green). Y-axis ranges from 0 to 4,000,000.

Purpose

The purpose of the study was to undertake a Cost-Effectiveness Analysis (CEA) of the introduction of HPV vaccines in Guyana are as follows:

Specific Objectives

1.   To estimate the costs of vaccination of one child.

2.   To estimate treatment cost of cervical cancers

3.   To estimate the Disability Adjusted Life Years (DALYS) averted and deaths averted because of the HPV vaccines.

4.   To estimate the cost effectiveness ratio for the introduction of HPV vaccination.

Methodology

❖This study employed the use of CEA to assess the introduction of HPV vaccine in Guyana as apart of the routine EPI programme. The study used a model-based economic evaluation approach.

❖The study perspective is from a provider or health system perspective where travel cost, salaries, procurement of commodities, health promotion among others were accounted.

❖Time horizon of five years(2017-2021)

❖Discount rate 3%.

❖The primary outcome measure is the cost per vaccination, the cost per DALY averted per female and the number of deaths averted

Methodology Cont'd

❖ Data Gathering: Quantitative methods were used to collect secondary data such as reports which captured expenditure (payment vouchers, reports and receipts).

❖ Sensitivity analysis was performed to examine the robustness of the key assumptions within the model The parameter included cost of the vaccine, discount rate and mortality impact .

❖ The comparator that was use with regards to the outcome variable was that an incremental cost effectiveness ratio (ICER) was calculated i.e. the additional effect (a female death averted because of vaccination) for additional cost of NO HPV vaccine .

Methodology

The tool used to calculate cost effectiveness is the Papillomavirus Rapid Interface for Modeling and Economics (PRIME) tool which is a Microsoft Excel-based model that estimates the health and economic effectiveness of vaccination of girls against HPV before sexual debut this tool is supported by WHO.

PRIME is used to measure the magnitude of the burden of cervical cancer, the impact of introducing HPV vaccination for girls prior to sexual debut, healthcare costs incurred as a result of cervical cancer treatment, costs associated with vaccination and long-term savings which may result from a vaccination program.

Results-Data Inputs

Field label	Explanation	Source
Cohort size at vaccination age (female)	6,500	Proposal to GAVI for the Introduction of HPV vaccine nationwide in Guyana-2017
Full-dose coverage	2 doses	-do-
Vaccine efficacy vs HPV 16/18	100%.	-do-
Target age group	10 Years. (PRIME dose not factor catch up campaign)	
Vaccine price procurement cost per fully vaccinated girl	$ 9 (2017-2018) $ 16 (2019-2021)	PAHO revolving fund
Vaccine delivery cost per fully vaccinated girl	$ 0.9 (2017-2018) $ 1.6 (2019-2021)	Expanded Program on Immunization Multi-Year Plan 2017-2021-Guyana
Total vaccine cost per fully vaccinated girl	$ 9.9 (2017-2018) $ 17.6 (2019-2021)	
DALYs for terminal cancer	0.78	WHO
Discount rate (%)	3% per annum	WHO

Results-Undiscounted

Item	Stage 1 a	Stage II b or II a	Stage II b, III or IV a	Stage IV b
Cost of Vaccination	$64,714	$64,714	$64,714	$64,714
Treatment cost	$1,208,995	$2,627,055	$1,930,464	$918,967
Net Cost	$1,144,281	$2,562,341	$1,865,750	$854,253
Cervical Cancers prevented	218	218	218	218
Deaths prevented	123	123	123	123
Life years saves	2,060	2,060	2,060	2,060
Nonfatal DALYs prevented	155	155	155	155
DALYs Prevented	$531	$1,171	$857	$ 400
GDP per capita	$3,724	$3,724	$3,724	$3,724

Results-Undiscounted

Item	Stage 1 a	Stage II b or II a	Stage II b, III or IV a	Stage IV b
Cost of Vaccination	$64,714	$64,714	$64,714	$64,714
Treatment cost	$349,744	$759,967	$558,454	$265,843
Net Cost	$285,030	$695,253	$493,740	$201,129
Cervical Cancers prevented	60	60	60	60
Deaths prevented	26	26	26	26
Life years saves	489	489	489	489
Nonfatal DALYs prevented	41	41	41	41
DALYs Prevented	$599	$1,374	$993	$441
GDP per capita	$3,724	$3,724	$3,724	$3,724

Effect of vaccination on incidence of cervical cancer by age
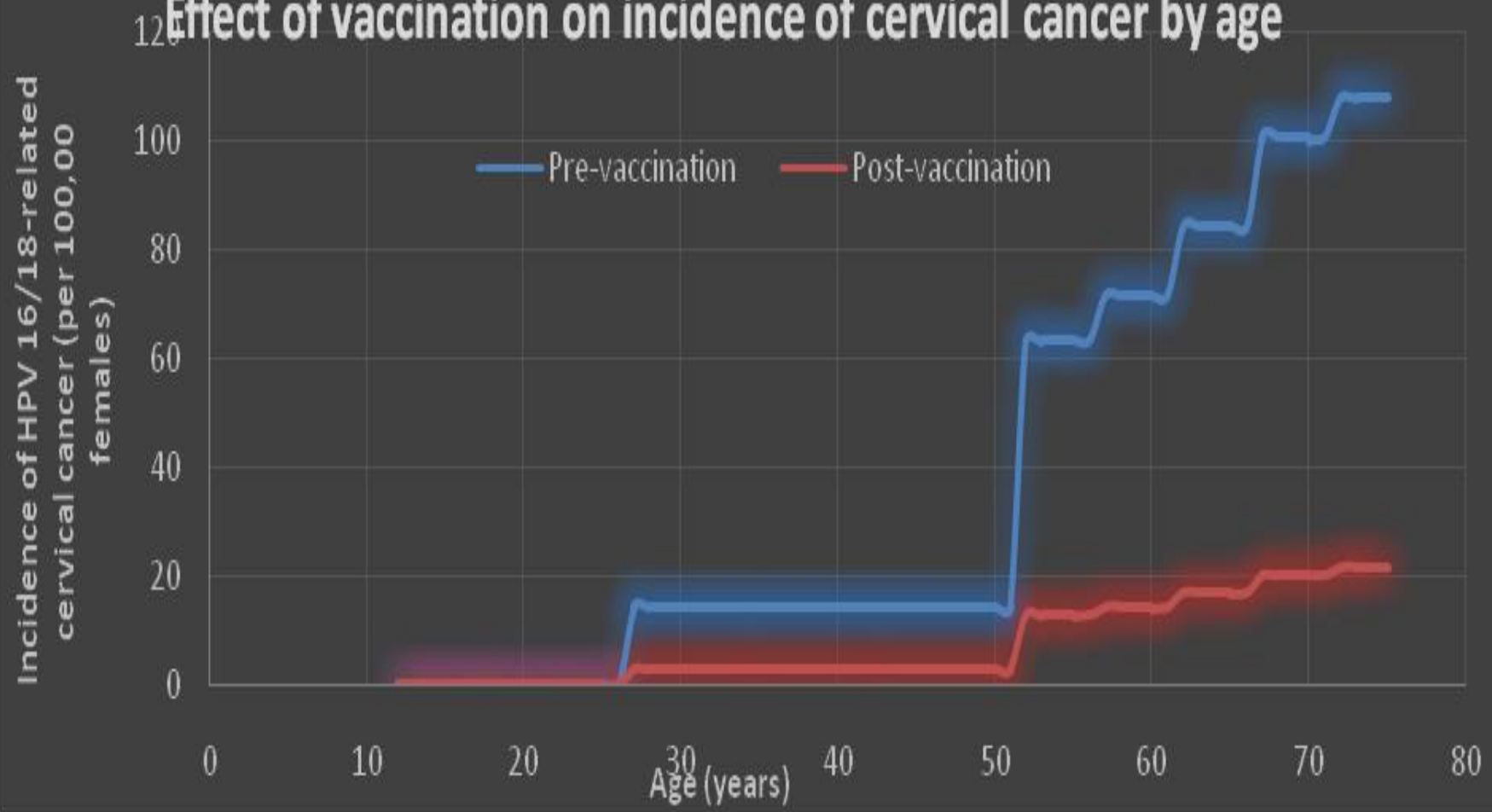
Findings

The total financial cost of the distribution campaign was $ 64,714 with the average cost of administering one vaccine was 9.9 USD.

The results of this analysis in which has been found that the HPV vaccination campaign has a good incremental cost effectiveness ratio.

The implementation of the project has generated a net gain in the welfare of the population of Guyana. Therefore, the HPV vaccines is cost effective because the DALYs averted is three times less that the GDP per capita.

❑ Stage Ia is estimated to be $ 531 per DALYs adverted,

❑ Stage II b or IIa is estimated to be $1, 171 DALYs adverted

❑ Stage II b, III or IV a $ 857 DALYs adverted and

❑ Stage IV b $ 400 per DALYs adverted as compare to a GDP per capita.

The results of the sensitivity analysis show that the results are robust to changes to cost of the vaccines, discount rate and the mortality impact which was the number of deaths averted.

Country Experience

Guyana lost eligibility for funding through grants for introduction of new and under used Vaccines form GAVI after graduating to a Low Middle Income country

A profile of Cancers in Guyana, 2014 indicated that cervical cancer was the second most common cause of cancer related deaths in Guyanese women with an incidence of 46 per 100,000 pop.

The country recognized the need for HPV vaccination but was unable to procure because of the high cost (US $17.6 per dose)

The government sought funding from GAVI through the copayment system while attempting to secure sustainability.

The cost effectiveness analysis was also conducted to secure funding for additional continuous routine activities in subsequent years(sustainability)

Solutions to challenges identified

Challenges	Solutions
Increasing the budgetary allocations from government budget for routine activities outside of purchase of vaccines	-Cost effective analysis for the introduction of HPV was conducted -Utilizing aspects of the current EPI for activities that can be easily absorbed in this process such as distribution and logistics for vaccines
Other sources of funding for HPV campaigns	-Encourage regions to advocate with private entities for support and promote Private Public Partnerships and inter agency collaboration

Lessons learned for other Caribbean Countries

Introduction of HPV vaccines requires very detailed planning before initiating the process with a detailed budget

Low middle income countries like Guyana needs support beyond the purchase of vaccines (especially for the support activities) in-order to reach the target

A structured decentralized EPI reduces unnecessary costs and bottlenecks in implementation

Research to support evidence based decision making is highly recommended and adds to the case with the policy makers

Civil society, NGOs and the private sector can contribute in "cash or kind" to facilitate the campaigns

Continuous monitoring is needed for effective implementation