**Current global pricing policies for human papillomavirus vaccines bring the greatest economic benefits to rich countries**

**Abstract**

Vaccinating females against human papillomavirus prior to sexual debut is an effective way to prevent cervical cancer, yet vaccine uptake in low and middle income countries has been hindered by high vaccine prices. We created an economic model to estimate the distribution of the economic surplus – the sum of all health and economic benefits of a vaccine, minus the costs of development, production, and distribution - among different countries and manufacturers for a cohort of 12 year old females in 2012. Our results showed that manufacturers may have received economic returns worth five times their original investment in HPV vaccine development. High-income countries gained over five times more economic value per vaccinated female than low-income countries, which was the greatest economic surplus of any income category. Subsidising vaccine prices in low and middle income countries may reduce financial barriers to vaccine adoption while still allowing high-income countries to retain their economic surpluses and manufacturers to retain their profits.

**Introduction**

Vaccines against human papillomavirus (HPV) are touted as a global health success story, with reason. They are highly efficacious at preventing persistent HPV infection, which is a necessary cause of cervical cancer, a disease that kills over 250,000 women annually (1). There are two HPV vaccines that are widely used: a bivalent vaccine which prevents the two HPV types (16 and 18) responsible for 70% of cervical cancer cases, and a quadrivalent vaccine which contains HPV 16 and 18, as well as two other types that cause most cases of genital warts. Additionally, a nonavalent vaccine that includes five more HPV types, responsible for an additional 10-20% of cervical cancer cases, was recently licensed.

The World Health Organization recommends that 9-13 year old females are vaccinated (2), as the vaccines are most effective prior to sexual debut, but are only licensed for females aged 9 years and over. Vaccinating this group is likely to be a cost-effective investment in almost every country (3). Most developed countries have already incorporated HPV vaccines into their national immunisation schedules. Adoption has been slower in developing countries even though that is where almost 90% of cervical cancer deaths occur(1). Adoption in the poorest countries was expedited by an agreement for 2013-2017 between Gavi, the Vaccine Alliance, and vaccine manufacturers to purchase vaccines on behalf of these countries at very low prices (4). However, the cost of vaccination remains a barrier to more widespread adoption (5)(6)(7), particularly in middle income countries that are not eligible for the lowered Gavi prices and increased financial support.

Vaccines on national immunization schedules are often procured through public sector tenders. Tender prices are negotiated and are usually lower than retail prices. However, tender prices are usually subject to confidentiality agreements (8), and therefore countries do not know the tender prices in other countries. This information asymmetry places countries in a weak position to negotiate prices based on vaccine value. Furthermore, the mechanism by which prices are set for different countries is unclear and has been criticised for not always producing equitable or affordable outcomes (9).

Vaccine manufacturers have a system in which prices are set according to country income level tiers. An analysis by the non-government organisation Médecins Sans Frontières suggests that prices in each tier are not known to countries and do not appear to be based on the health and economic benefit of receiving the vaccines (10). Manufacturers are not obliged to consider transparency or public benefit when setting prices. Several commentators believe that vaccine prices in low and middle income countries need to fall further and be more transparent in order to expedite vaccine introduction in these settings (7,8,11). However, lowered prices would need to be balanced by the ability of manufacturers to retain positive producer surpluses after accounting for vaccine development costs.

One way to address this issue would be to explicitly set vaccine prices based on the estimated value of the health benefits of vaccination (including the healthcare cost savings from reducing disease burden). In this article, we estimate the value of these health benefits that could be obtained from HPV vaccination. We explore the way these benefits are distributed between different countries and manufacturers, and examine the effect of six alternative pricing scenarios on the distribution of benefits.

**Study Data and Methods**

*Analytical overview*

The sum of all of the potential health and economic benefits from the HPV vaccine less the cost of its development, production and distribution is called the economic surplus due to HPV vaccination. We divided this into the consumer surplus (the difference between the value of benefits that countries receive from vaccination and the amount they pay for the vaccines) and the producer surplus (the difference between the revenue that manufacturers receive from selling the vaccine and the cost to develop, manufacture and market it). An explanation of how we calculated health benefits derived from the HPV vaccine is described below.

*Producer surplus*

The producer surplus was calculated as the total revenue earned from HPV vaccine sales by manufacturers, less the cost of developing, manufacturing and marketing the vaccines. Development costs were inflated to account for the fact that successful vaccines cover development costs for those vaccine candidates that failed to reach the market.

Producer surplus was used for two comparisons. First, revenues from HPV vaccine sales in 2006-2014 were compared to the cost of developing the vaccine. This was done to calculate the manufacturers’ return on investment in 2006-2014; a positive return on investment indicated that HPV vaccination was a profitable investment. Second, revenues from selling vaccines to countries in order to vaccinate the entire 2012 cohort of 12-year of females were compared to the cost of manufacturing and marketing the vaccines, as well as the annualised vaccine development costs.

*Consumer surplus*

The consumer surplus was calculated as the difference between improved health and reduced cervical cancer treatment costs from vaccination, with the cost of purchasing and delivering the vaccine. Improved health was measured in terms of the number of disability adjusted life years (DALYs) averted by vaccination. We used the Papillomavirus Rapid Interface for Modelling and Economics (PRIME), which is a mathematical model developed to estimate the cost-effectiveness of HPV vaccination in 179 countries (3), to calculate the DALYs averted and treatment costs saved from vaccinating the 2012 cohort of 12-year old girls at 80% coverage.

Health gains were then converted into their economic value by multiplying each DALY averted by each country’s gross domestic product (GDP) per capita (12). Hence, richer countries gained more economic value from an averted DALY than poorer countries, as is the case in many health economic evaluations. Further methodological justification for using GDP per capita as a DALY multiplier, including citations to relevant literature, is provided in the online Appendix (13).

The online Appendix also provides further details of methodological assumptions, calculations and data sources used (13).

*Sensitivity Analyses*

We altered key assumptions in order to create five alternative sensitivity analysis scenarios. The first two scenarios used 0.52 times and 2.2 times GDP per capita for the economic value of each DALY averted to represent the range of health valuations proposed in comparable literature.

Third, we assumed that non-cervical cancers, such as those of the vulva, vagina, anus, penis, mouth and oropharynx, would also be prevented by HPV vaccination, as these cancers have been linked to HPV types 16 and 18. We assumed that preventing non-cervical cancers had the same impact on treatment costs and DALYs as preventing a cervical cancer case.

Fourth, because the World Health Organization recently recommended that providers offer a two-dose HPV vaccine schedule rather than three (2), we assumed that every country in our study had done so. We also assumed that manufacturers kept per-dose vaccine prices constant, so that both procurement and administration costs were reduced by two-thirds.

Fifth, we restricted our analysis to countries that had introduced national HPV vaccination programmes by July 2015 (14).

*Alternative Vaccine Price Scenarios*

We considered six alternative scenarios about how HPV vaccines could be priced, First, we assumed that the full retail price was paid for vaccines because in some countries, HPV vaccines are not procured through public sector tenders.

Second, we assumed a price reduction of 37% for bivalent HPV vaccines in all countries to match the same decrease in prices set by the Pan American Health Organization Revolving Fund between 2013 and 2015. The Revolving Fund facilitates the pooling of resources to procure vaccines for its member states (15). Those prices dropped from $13.50 to $8.50 per dose.

Third, Nelson and co-workers (7) have suggested that other middle-income countries should develop regional pooled procurement strategies (in which countries negotiate vaccine prices as one group in order to increase negotiating power) similar to those created by Gavi and the Pan American Health Organization Revolving Fund. We assumed that as a result of such initiatives, all middle-income countries were able to obtain the same price of $8.50 per dose.

Fourth and fifth, we assumed that all low- and lower-middle-income countries paid nothing for HPV vaccines, with either high-income countries paying extra or manufacturers reducing profits to make up the difference.

Sixth, we assumed that every country paid the same price of $21.34 per dose of HPV vaccine, which is the price at which manufacturer revenues would be unchanged.

*Limitations*

Our analysis had several limitations. We used a model to project vaccine impact which did not take into account indirect (herd) immunity or protection for non-vaccinated individuals as a result of reduced transmission. However, the effect of this simplification is small at the high levels of coverage that we assumed (80%). We considered vaccination of 12-year old females alone; some countries also vaccinate older females as well as males. We also did not consider the vaccine benefits of reduced cancer screenings and treatments of pre-cancerous neoplasias or genital warts. We assumed that vaccine manufacturers captured the entire producer surplus, but in reality part of this may go to distributors.

**Results**

*Producer return on investment*

Total HPV vaccine sales for the manufacturers of both bivalent and trivalent vaccines was $14.1 billion in 2006-2014. We estimate that clinical trials cost $2.2 billion (see Appendix for details), so pre-clinical studies would cost $0.7 billion if they were 30% of total costs. Public sector grants in the United States and Australia leading to patents that enabled HPV candidate vaccines were estimated to cost $4.9 million, which would imply that they were sold to manufacturers with a markup of over 130 times cost. Even using a figure of $2.9 billion in total costs, manufacturers would have already achieved a positive return of almost five times on their investment. For comparison, vaccine development for two rotavirus vaccines was estimated to cost $317-974 million (16).

*Economic surplus per vaccinated cohort*

We found that the cost per DALY averted is well below the regional GDP per capita in every country income group, suggesting that HPV vaccination is cost-effective everywhere. The total economic surplus produced by vaccinating each cohort of 12-year old females against HPV was $13 billion (Exhibit 2) in 2012. High-income, upper-middle-income and lower-middle-income countries each received approximately equal shares of this surplus, but low-income countries received a smaller share. Because the size of the vaccination cohort in each country income groups differs, high-income countries received the largest surplus per vaccinated female. The cost per DALY averted was most favourable in low-income countries but the economic surplus decreased with income level: high-income countries gained over five times more economic value per vaccinated female compared to low-income countries. However, most of the cost of vaccine procurement and delivery in these countries was met by Gavi.

**Alternative Scenarios**

The distribution of the economic surplus among countries changed with each different parameter and pricing scenario (Exhibit 3). At a lower monetisation rate of DALYs averted of 0.52 times GDP per capita, less of the surplus goes to consumers, particularly high-income countries. The opposite happens with a high rate of 2.2 times GDP per capita. However, low-income countries’ share remains fairly static at around 5-6% of the total surplus.

If HPV vaccines also protect against other cancers besides cervical cancer, then the economic surplus increases overall, but most of the additional benefit goes to high-income countries since non-cervical HPV-related cancers form the largest proportion of HPV-related cancers in these countries.

If we only included the countries that had introduced nationwide HPV vaccination by July 2015, the share of the surplus received by lower-middle and low income countries decreases to almost 0%, showing slow uptake of vaccination by these countries.

 The greatest change between alternative pricing scenarios was seen when the full retail price was paid for vaccines (Exhibit 4); under this scenario manufacturers captured 87% of the economic surplus due to HPV vaccination, and the share of surplus for all countries except low-income countries (who are eligible for Gavi prices) was sharply reduced. Indeed, upper-middle-income countries actually spent more than the value they received from vaccination. More pooled procurement increased upper-middle-income countries’ share of the surplus at the expense of the manufacturers, but had little impact in other countries. An explicit subsidy increased the share of the surplus for lower-middle-income countries in particular, at the expense of either high-income countries or manufacturers. If tiered pricing was not used at all, then low income countries’ share of the surplus dropped to only 2%.

**Discussion**

The global economic surplus from the development of HPV vaccines is measured by the net value of public benefits that they confer. The amount of surplus per vaccinated 12-year old female indicates how the overall surplus is distributed among vaccinated females in countries from different income categories. Our results demonstrate that the surplus per vaccinated female is distributed more equally across countries when pricing is tiered than it would be without. However, even at current tiered prices, high-income countries still receive the largest share of surplus per vaccinated female, while low-income countries receive the lowest share. Indeed, even when costs of vaccination in low and lower-middle income countries are completely covered by high-income countries and/or manufacturers, high-income countries still receive a larger share of the surplus and manufacturers still receive a positive return on investment.

Like previous analyses, we found that HPV vaccination is likely to be cost-effective in all country income groups. Indeed, the cost per DALY averted is most favourable in low income countries. From the perspective of the consumers of vaccination, the majority of DALYs averted due to HPV vaccination would benefit low and lower middle income countries if vaccination was implemented everywhere. However, from the perspective of the payer and of society, HPV vaccination may be cost-effective but unaffordable. The opportunity costs of vaccination (in terms of DALY averted by other interventions that can be purchased with the same money) are greater and the economic gains of each averted DALYs are smaller in such settings. These reasons may have contributed to vaccine uptake being lower in these countries despite the favourable cost-effectiveness profile.

In performing our analysis, our economic surplus calculations relied on the ability to determine the economic value of improved health due to vaccination. We did this by pricing one averted DALY (gaining one year of disability-free life) in accordance with a country’s GDP per capita. This rate of conversion has been used by the World Health Organization to evaluate the value of health interventions at the subregional level (17). It is based on the extra market income created when a person lives an extra year in good health. Other means of valuing vaccination consider the alternative uses for money that might have existed had money not been spent on HPV vaccination, or the amount that people are willing to pay to avoid premature mortality. These methods also give more economic value to a DALY averted in rich countries. Our method of analysis simply captured the economic benefits of improved health and the consequences of committing resources to improving health in a resource-constrained world. They are not meant to be a value judgment on the intrinsic worth of a life.

A portion of the economic surplus is retained by vaccine manufacturers. This rewards them for their investment in vaccine research and development, and helps to generate profits in excess of manufacturing costs for each vaccinated cohort. Manufacturer revenues have been bolstered by high prices paid by early adopter high-income countries such as the United States, where a dose of HPV vaccine in 2015 cost around $150 (18). HPV vaccines were first adopted in the USA, Australia, Canada and several western European countries in 2007 (19). By the end of 2014, over 200 million doses of HPV vaccines had been distributed around the world, mostly to high-income countries (20). Some maturation in vaccine prices has already occurred, for example in the decreasing price for HPV vaccines paid by the PAHO Revolving Fund from $32.00 in 2010 to $13.50 in 2013 and finally $8.50 in 2015. In the future, the expiry of patents and the entry of new manufacturers in developing countries may bring about further price reductions. However, waiting for price maturation creates a delay in adoption of a potentially life-saving and cost-effective intervention among low and middle income countries. Most of these countries have yet to implement nationally-funded HPV vaccination programmes almost 10 years after the vaccine became available. Our calculations show that as of July 2015, lower-middle and low income countries have not yet appropriated most of the economic surplus they could obtain through HPV vaccination.

**Policy Implications**

Our results highlight the role of bulk procurement tenders in ensuring that the amount paid for vaccines is much less than the value of the health and economic benefits of vaccination. If all countries paid retail instead of tender prices for vaccines, their share of the estimated $13 billion global economic surplus from HPV vaccination of a single birth cohort would decrease from 73% to 13%, and many countries would be paying more for vaccination than the value they receive in return. However, outside of settings where pooled procurement is practiced (for example via Gavi or PAHO), the process by which vaccine tenders are negotiated is not transparent. Hence, we cannot be certain that countries really do receive the 75% price reduction that our extrapolation from publicly available data suggests. Successful country-led vaccine negotiations require robust institutions for public procurement, transparent tendering arrangements and understanding of pharmacoeconomic drivers of value in health. Not all of these features are in place in every country. We can assume many countries see current HPV vaccine prices as prohibitive, since vaccine uptake in countries with the highest cervical cancer incidence has lagged behind that of high-income countries (3).

Increasing the subsidisation of vaccine prices in low and lower-middle-income countries may reduce financial barriers to vaccine adoption (7,8,11). Our calculations suggest that even the most generous subsidy, which reduced the price of vaccine procurement to zero in these countries, would only reduce the economic surplus captured by high-income countries by 29% and the manufacturer profits by 32%. Although feasible, such transfers are obviously not without costs; they would require vaccine price increases in high-income countries (if they reduce the high-income country surplus) and/or reduced investment in pipeline products with the lowest likely returns on investment (if they reduce the producer surplus).

In this article, we did not explore the contractual or legislative mechanisms that could achieve a redistribution of the economic surplus due to vaccination. It is possible that such a mechanism would involve extending regional pooled procurement arrangements to a global level. This would enable vaccine prices to be tied to the economic value of vaccination in different settings, rather than the market considerations that currently drive tiered pricing schemes outside of Gavi-eligible countries.

Lowering prices in lower-middle-income countries may be more challenging than doing so in low-income countries. Private demand for vaccines in low-income countries is very small, so there are few profits to be made by manufacturers. In contrast, there is a sizeable middle class in middle-income countries with the means to purchase vaccines at current prices. However, relying on private demand alone to increase vaccine uptake in these settings would concentrate vaccine coverage in the middle class, jeopardising broader community-wide benefits of vaccines, such as herd protection and reductions in health disparities (21). Furthermore, vaccine prices are not always driven by short-term profit considerations alone, but take into account a range of factors that may shape the long-term market for vaccines (22). For example, GlaxoSmithKline in collaboration with the Malaria Vaccine Initiative has developed a vaccine against malaria at a price from which the manufacturer will make little profit.

**Conclusion**

Both vaccine manufacturers and high-income countries have received large economic surpluses from the development of HPV vaccines. Developing countries also have potential to enjoy economic surpluses from vaccination. However, vaccine adoption has been hindered by high and non-transparent pricing schemes, particularly in middle-income countries. Alternative pricing schemes, which explicitly and transparently take into account the health and economic value of HPV vaccination in different countries rather than relying on market forces alone may expedite vaccine adoption in these settings. Such schemes would still enable high-income countries and manufacturers to obtain a positive economic surplus. In the interim, the development of methods and databases to provide countries with accurate and comprehensive information on vaccine prices and values could improve the bargaining position of countries that are not currently part of pooled procurement schemes.

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**Exhibit List**

**EXHIBIT 1 (table)**

Caption: Data sources used to estimate cost parameters in our analysis.

Source: See table.

**EXHIBIT 2 (table)**

Caption: Distribution of DALYs averted and economic surplus from HPV vaccination between countries and manufacturers.

Source: Authors’ analysis.

[a] Benefits are sale revenues for manufacturers, and total monetised DALYs and health care costs averted for countries.

[b} Costs are manufacturing costs for manufacturers, and vaccine procurement and administration costs for countries.

[c] Benefits minus costs.

**EXHIBIT 3 (table)**

Caption: Distribution of economic surplus from HPV vaccination under different parameter assumptions and pricing scenarios.

Source: Authors’ analysis.

Notes: In $billion, % share of total surplus in parentheses.

**EXHIBIT 4 (table)**

Caption: Average procurement price per vaccine course under different parameter and pricing scenarios.

Source: Authors’ analysis.

**Exhibit 1:**

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Source** |
| Cervical cancer treatment cost savings due to vaccination | Varies by country | Output of PRIME model (3) |
| DALYs due to cervical cancer prevented due to vaccination | Varies by country | Output of PRIME model (3) |
| Willingness to pay to prevent a DALY | GDP per capita of the country | World Health Organization’s Choosing Interventions that are Cost-Effective (WHO-CHOICE) (12) |
| Vaccine purchase costs | $4.55 for Gavi countries. | Gavi press release (23) |
| $8.50 for countries in the PAHO region. | PAHO Revolving Fund prices (15) |
| In other countries, ranges from $9.50 - $114.50 | Literature review and extrapolation to countries without data (see Appendix) |
| Vaccine delivery costs | $5 (low income countries) $15 (middle income countries)$25 (high income countries) | Previous PRIME analysis (3) |
| Population size (total and size of 12-year old female cohort) | 2010 United Nations Population estimates | World Population Prospects: The 2010 Revision (24) |
| Vaccine discovery costs | $3.6 million (value of grants awarded)$0.8 billion (30% of clinical trial costs) | Research Portfolio Online Reporting Tools (RePORTER); Tufts University study (25) |
| Vaccine clinical trial costs | $1.8 billion | Extrapolation of influenza vaccine trial costs (26) |
| Vaccine marginal manufacturing costs | $4.50 a dose | Statement by Merck in 2013 (27) |
| Vaccine marketing costs | 9% of sales revenue | Cost of drug promotional activities to consumers and providers in the United States in 2010 (28) |
| Revenue from vaccine sales (2006 - 2014) | $14.1 billion | Security and Exchange Commission Form 20-F filed by Merck and GSK in 2006 – 2014, inflated to 2014 USD  |

**Exhibit 2:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Country income category** | **Manufacturer** | **Total** |
|  | **High**  | **Upper-middle**  | **Lower-middle**  | **Low** |
| **DALYs averted (m)** | 0.12 | 0.47 | 1.06 | 0.59 |  | 2.24 |
| **% of global** | 5.3% | 21.1% | 47.3% | 26.2% |  | 100.0% |
| **Cost per DALY averted** | 11,700 | 3,700 | 1,150 | 330 |  | 2,030 |
| **GDP per capita** | 33,000 | 10,000 | 3,500 | 2,000 |  | 9,200 |
| **Vaccinated girls (m)** | 6.82 | 17.3 | 24.4 | 9.61 | 58.1 | 58.1 |
| **Benefits ($b)** | 4.13 | 5.19 | 3.85 | 0.962 | 3.72 |  |
| **Costs ($b)** | 1.23 | 1.49 | 0.86 | 0.13 | 0.79 |  |
| **Surplus ($b)** | 2.73 | 3.44 | 2.62 | 0.77 | 2.93 | 12.5 |
| **% of global surplus** | 21.9% | 27.5% | 21.0% | 6.2% | 23.% | 100.0% |
| **Surplus per vaccinated girl ($)** | 401 | 199 | 108 | 80 | 51 | 215 |

**Exhibit 3:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **High income** | **Upper-middle income** | **Lower-middle income** | **Low-income** | **Manufacturer** | **Total** |
| **Cohort size** |  6.82 (12%)  |  17.3 (30%)  |  24.4 (42%)  |  9.61 (17%)  |  |  58.1  |
| **Economic surplus** |
| Base case |  2.73 (22%)  |  3.44 (28%)  |  2.62 (21%)  |  0.769 (6%)  |  2.93 (23%)  | 12.5 |
| *Sensitivity analyses* |
| Health value 0.52 GDP/capita |  0.763 (13%)  |  0.967 (17%)  |  0.798 (14%)  |  0.316 (5%)  |  2.93 (51%)  |  5.8  |
| Health value 2.2 GDP/capita |  7.66 (26%)  |  9.62 (33%)  |  7.19 (25%)  |  1.9 (6%)  |  2.93 (10%)  |  29.3  |
| Non-cervical cancers |  3.89 (25%)  |  4.47 (29%)  |  3.21 (21%)  |  0.865 (6%)  |  2.93 (19%)  |  15.4  |
| 2-dose |  3.2 (25%)  |  4.02 (31%)  |  3.03 (23%)  |  0.833 (6%)  |  1.8 (14%)  |  12.9  |
| July 2015 introductions |  0.894 (16%)  |  2.34 (42%)  |  0.0283 (1%)  |  0.0125 (0%)  |  2.32 (41%)  |  5.6  |
| *Alternative pricing scenarios* |
| Retail price |  1.05 (9%)  |  -0.863 (-7%)  |  0.718 (6%)  |  0.769 (7%)  |  10.1 (86%)  |  11.8  |
| PAHO 13.50 |  2.73 (22%)  |  3.37 (27%)  |  2.61 (21%)  |  0.769 (6%)  |  3.01 (24%)  |  12.5  |
| MIC 8.50 |  2.73 (22%)  |  4.49 (36%)  |  2.87 (23%)  |  0.769 (6%)  |  1.75 (14%)  |  12.6  |
| HIC subsidy |  1.74 (14%)  |  3.44 (28%)  |  3.49 (28%)  |  0.9 (7%)  |  2.93 (23%)  |  12.5  |
| Manufacturer subsidy |  2.73 (22%)  |  3.44 (28%)  |  3.49 (28%)  |  0.9 (7%)  |  1.94 (16%)  |  12.5  |
| No tiered pricing |  3.53 (28%)  |  3.82 (31%)  |  1.93 (15%)  |  0.284 (2%)  |  2.93 (23%)  |  12.5  |

**Exhibit 4:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **High income** | **Upper-middle income** | **Lower-middle income** | **Low-income** | **Total** |
| Base case | 180.00 | 86.40 | 35.50 | 13.70 | 64.00 |
| *Sensitivity analyses* |  |  |  |  |  |
| Health value 0.52 GDP/capita | 180.00 | 86.40 | 35.50 | 13.70 | 64.00 |
| Health value 2.2 GDP/capita | 180.00 | 86.40 | 35.50 | 13.70 | 64.00 |
| Non-cervical cancers | 180.00 | 86.40 | 35.50 | 13.70 | 64.00 |
| 2-dose | 120.00 | 57.60 | 23.70 | 9.10 | 42.70 |
| July 2015 introductions | 425.00 | 104.00 | 66.70 | 13.70 | 260.00 |
| *Alternative pricing scenarios* |  |  |  |  |
| Retail price | 427.00 | 335.00 | 114.00 | 13.70 | 200.00 |
| PAHO 13.50 | 181.00 | 90.30 | 36.10 | 13.70 | 65.50 |
| MIC 8.50 | 180.00 | 25.50 | 25.50 | 13.70 | 41.70 |
| HIC subsidy | 326.00 | 86.40 | 0.00 | 0.00 | 64.00 |
| Manufacturer subsidy | 180.00 | 86.40 | 0.00 | 0.00 | 46.90 |
| No tiered pricing | 64.00 | 64.00 | 64.00 | 64.00 | 64.00 |