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HEU Policy Briefs present summarised research findings and key policy recommendations on important health care policy issues in Sub-Saharan Africa.

Preventing cervical cancer in South Africa

Would adding the HPV vaccine to the screening programme be cost-effective?

Introduction

Human papillomavirus (HPV) causes about 6 800 new infections and 3 700 deaths from cervical cancer every year in South Africa. Cervical cancer is the most common cancer in women in this country with the age-standardised incidence rate of 30 per 100 000 per year (Mqoqi *et al*, 2004).

South Africa's cervical cancer prevention programme consists of a national cervical cancer screening policy which aims to screen at least 70% of women attending public sector services over a 10-year period using the Papanicolaou cytology technique. However, effective screening programmes have been difficult to implement in South Africa (Moodley *et al*, 2006).

The recent development of the HPV vaccine offers a new approach to cervical cancer prevention in South Africa. Studies have estimated that a vaccine preventing 75% of persistent HPV (types 16 and 18) infections could be associated with a 70–83% reduction in HPV-related cancer (Goldie *et al*, 2004). HPV vaccines are not currently available in the public sector.

Research objective

The research asks whether a cervical cancer prevention programme that includes an HPV vaccine is more cost effective than the current strategy of screening alone.

Methods

The cost-effectiveness of adding the HPV vaccine to the secondary cervical cancer prevention programme was estimated in terms of incremental cost per life year saved, and incremental quality-adjusted life years (QALYs) gained (compared with the current strategy - i.e. screening only). The cost-effectiveness analysis was undertaken from a health service perspective (the costs of providing different screening, treatment and vaccination services borne by the public sector organisations delivering the services and the Provincial Reproductive Health Programme) and a societal perspective (health service perspective and patient's travel and time costs). It was assumed that girls would be vaccinated at the age of 12 years followed by screening.

Box 1: What does 'cost-effectiveness analysis' mean to economists?

Cost-effectiveness analysis (CEA) is a method of comparing alternative health programmes or treatments in which the costs and outcomes of the programmes/treatments vary. In CEA, the incremental cost of a programme is compared to the incremental health effects of the programme. The health effects are measured in natural units such as cases of disease averted, lives saved, or life-years gained.

Because most health interventions impact upon both length and quality of life, a **cost-utility analysis (CUA)** that uses a generic outcome measure such as **quality-adjusted life years (QALYs)** is becoming more popular. CEA and CUA are identical on the cost side but differ on the outcomes side. By providing a generic outcome for the health effects, CUA is also useful for comparisons of costs and outcomes in different health programmes.

The most relevant measures of cost-effectiveness are the **incremental cost-effectiveness ratios (ICERs)** of programmes relative to their alternative options. The ICERs are obtained by dividing the cost differences by the outcome differences for the alternative programmes. If the costs and outcomes of the programme occur at different times (as is the case with preventative measures such as a vaccination), they need to be discounted. **Discounting** is based on the assumption that costs incurred and outcomes realised today are not equivalent to the same costs and outcomes in the future.

Box 2: How do economists conclude that a policy intervention is cost-effective?

Interventions with an incremental cost-effectiveness ratio (ICER) below a certain willingness-to-pay for a quality-adjusted life year (QALY) threshold could be argued to be cost-effective. However, in practice, it is important to also consider the affordability of

a new intervention, particularly in the context of resource constraints. The HEU is currently completing research related to the budget impact of the implementation of the HPV vaccine in order to further inform the development of policy in this area.

Findings

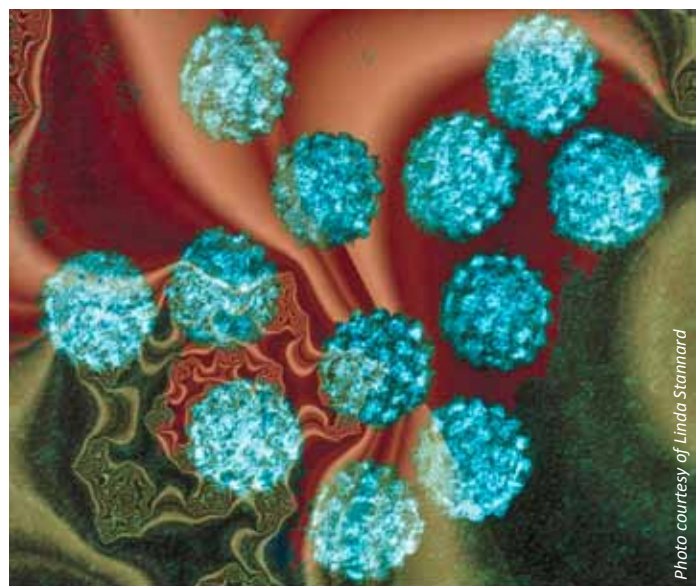
- ◆ From the societal perspective, the cost per vaccinated girl was R3,295. The most costly screening strategy is the HPV DNA test (R669 per woman). The cost of diagnosis and treatment of cervical cancer stage IV (R55,997 per woman) is almost double the cost of that for stage I (R29,997 per woman).
- ◆ Findings show that adding the HPV vaccine to the current screening strategy to prevent HPV-related diseases in South Africa is cost-effective (see Box 2 and Table 1).
 - When costs and benefits are not discounted, the vaccine followed by screening strategy is more cost-effective, and the screening only strategy is dominated (i.e. this strategy is both more costly and less effective).
 - When cost and benefits are discounted, the incremental cost-effectiveness ratios (ICERs) are R29,217 and R21,580 per life-year saved (R9,490 and R7,007 per quality-adjusted life year gained) from the health service and societal perspective, respectively.
- ◆ The cost-effectiveness of vaccination decreases with increasing HIV-related mortality. However, the data on HIV-related mortality used in our model assumes low access to ART. If ART is scaled up in the country, it is possible that vaccination will become more cost-effective, particularly given the vulnerability of HIV-positive women to cervical cancer.
- ◆ When patient costs were included in the analysis, the incremental cost-effectiveness ratio decreased by 26% on average. Therefore, whilst the presence of vaccination has the potential to reduce the cost of cervical cancer to the health system, it also can potentially decrease the cost to the patient—not an insignificant finding given the current levels of poverty in South Africa.
- ◆ Findings also show that a vaccine price reduction of 60% or more would make the vaccine followed by screening strategy more cost-effective than the screening only strategy.

Table 1: Cost-effectiveness of adding the HPV vaccine to the existing screening programme in 2007 Rands

Strategy	Lifetime cost	Life years saved	QALY: Quality-adjusted life years gained	ICER: Incremental cost-effectiveness ratios (life years)	ICER (QALY gained)
From the perspective of health service					
<i>Undiscounted</i>					
Screening only	4,173	51.95	51.74	dominated	dominated
Vaccine plus screening	3,204	52.07	52.04	more cost-effective	more cost-effective
<i>Discounted</i>					
Screening only	1,176	24.13	24.14	-	-
Vaccine plus screening	1,826	24.22	24.16	29,217	9,490
From the perspective of society					
<i>Undiscounted</i>					
Screening only	4,907	51.95	51.74	dominated	dominated
Vaccine plus screening	3,360	52.07	52.04	more cost-effective	more cost-effective
<i>Discounted</i>					
Screening only	1,404	24.13	24.08	-	-
Vaccine plus screening	1,878	24.16	24.15	21,580	7,007

Source: Adapted from Table 3, page 6200 (E. Sinanovic et al. / *Vaccine* 27 (2009) 6196-6202)

“HPV causes cervical cancer which is the most common form of cancer among women in SA. The vaccine has the potential to reduce the incidence of HPV-related diseases, and to reduce the cost of treating cervical cancer”.



PICTURED ABOVE: ELECTROPHOTOGRAPH OF THE HUMAN PAPILOMAVIRUS (HPV)

Photo courtesy of Linda Starmard

Policy implications

- ◆ Whilst a combination of vaccination and screening at the current vaccine price is more costly than screening alone, it is a cost-effective strategy for preventing cervical cancer.
- ◆ The main cost driver is the vaccine cost. If the vaccine price is reduced, vaccination followed by screening might be a very affordable policy option.
- ◆ The vaccine has the potential to reduce the incidence of HPV-related diseases, and to reduce the cost of treating cervical cancer.
- ◆ This requires a well-functioning screening programme aimed at secondary prevention of cervical cancer as the HPV vaccine does not eliminate, but rather reduces the risk of cervical cancer.
- ◆ In South Africa, screening coverage is very low (well below 50%) and adherence to treatment of pre-cancerous and cancerous lesions is also less than 100%, thus having another preventative measure could be desirable.
- ◆ Approaches for reducing the cost of introducing the vaccine (which should be publicly funded) include:
 - Accessing international funding mechanisms, such as the United Nations Children’s Fund (UNICEF) and public-private partnerships.
 - Commitments from the pharmaceutical companies to reduce prices.

Selected references

- Goldie SJ, Kohli M, Grima D, Wienstein MC, Wright TC, Bosch FX, et al. Projected clinical benefits and cost-effectiveness of a human papillomavirus 16/18 vaccine. *Journal of the National Cancer Institute* 2004;96(8):604–15.
- Moodley J, Kawonga M, Bradley J, Hoffman M. Challenges in implementing a cervical screening programme in South Africa. *Cancer Detection and Prevention* 2006;30(4):361–8.
- Mqoqi N, Kellet P, Sitas F, Jula M. Incidence of histologically diagnosed cancer in South Africa 1998–1999. *National Cancer Registry of South Africa*. Johannesburg: National Health Laboratory Service; 2004.