New studies shed light on what it cost to vaccinate girls against HPV in low income countries

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Two studies published in BioMed Central's open access journal *BMC Medicine* examined the cost of delivering the human papillomavirus (HPV) vaccine to primary school girls in Tanzania. Both studies found that the cost of HPV vaccine delivery to adolescent girls may be substantially higher compared with the cost of delivering a new vaccine to an infant where the delivery schedule matches the existing infant immunization schedule.

Cervical cancer is the second largest cancer-related killer of women in the world, with half a million new cases of cervical cancer worldwide in 2008, and it is the most common cause of cancer-related deaths in women in Tanzania. The main cause of this cancer is carcinogenic HPV types. The introduction of HPV vaccination in Sub-Saharan Africa offers a new opportunity for cervical cancer control. The WHO recommends vaccinating 9-13 year old girls to protect against HPV types 16 and 18, which contribute to the development of over 70% of cervical cancers. In most low- and middle-income countries, however, the vaccine price being offered to the public, at US$6-130 per dose, has been a barrier for vaccine uptake. Fortunately, the GAVI-Alliance (Global Alliance for Vaccines and Immunizations) announced in November 2011 that it would move towards funding support for HPV vaccines for eligible countries. HPV vaccines could therefore become an option in many countries where they would otherwise be unaffordable.

Information is lacking on large-scale, country-wide implementation costs of vaccine delivery. With this in mind, in the first paper, lead author Wilm Quentin from the Technical University in Berlin, and co-authors from the London School of Hygiene & Tropical Medicine, the National Institute for Medical Research in Tanzania and the World Health Organization (WHO) estimated the costs of a school-based HPV vaccine project that compared two different vaccine delivery strategies: class-based and age-based vaccination with health centre vaccination for those that missed a dose at school[1]. This study was implemented in randomly selected schools across 3 districts in Tanzania. The study also modelled incremental scaled-up costs of a regional vaccination program. Quentin et al found that, in general, costs for class-based delivery rather than age-based delivery were lower, and the economic scaled-up costs for Tanzania's Mwanza region were an estimated US$1.3 million (approx. US$9.76 per fully immunized girl, excluding vaccine costs).

In a second study, Raymond Hutubessy from the WHO and colleagues tested WHO new Cervical Cancer Prevention and Control Costing (C4P) tool over a five-year planning period. This tool assists low-and middle-income countries with planning their HPV vaccine programs and estimates the incremental costs to the health system of vaccinating adolescent girls through schools, health facilities and outreach-based strategies. The most important costs of service delivery were social mobilization, education and communication and operational costs such as training, health personnel time, vaccination cards, stationery, supervision and monitoring. It was estimated that the vaccine could be delivered at US$12.40 per fully immunized girl in terms of economic costs, again excluding vaccine costs. The authors noted that, when countries expand their routine immunization schedules with new vaccines to new target populations, as is the case with HPV vaccine, they face initial start-up costs to fund pre-introduction activities such as training, not to mention ensuring that the vaccine is delivered on an ongoing basis. However, after introduction, costs would be cheaper and

make HPV vaccination even more affordable. Hutubessy commented "These figures will enable governments to plan ahead so that they can adequately secure the financial resources required to introduce HPV vaccination programs."

Hutubessy, who was an author on both papers, believes that the estimated costs of establishing a regional HPV vaccine program that delivers 3 doses of vaccine to girls at schools via phased national introduction in Tanzania can potentially pose financial and logistical challenges to the Ministry of Health of Tanzania. The estimates from both studies of US$9.76-12.40 per fully immunized girl, excluding vaccine costs, are higher than delivery costs of existing routine vaccination programs. At the same time he also believes that HPV vaccination programs will be more affordable and easier to implement in low resource settings compared to other preventive cervical cancer interventions such as population based screening programs. In addition, other studies have suggested that HPV vaccination at US$25 per fully-immunized girl would be very cost-effective in Eastern Africa.

Given the current challenges in achieving high coverage with cervical screening programmes in low income countries, HPV vaccination will be an important public health intervention for the prevention of cervical cancer. A further reduction in vaccine price and integration of HPV vaccination with other adolescent health interventions could improve the affordability and hence the cost-effectiveness of HPV vaccination programs, especially in low and middle income countries where the existing health systems are already stretched.

More information: Costs of Delivering Human Papillomavirus Vaccination to School Girls in Mwanza Region, Tanzania, Wilm Quentin, Fern Terris-Prestholt, John Changalucha, Selephina Soteli, John W Edmunds, Raymond Hutubessy, David A Ross, Saidi Kapiga, Richard Hayes and Deborah Watson-Jones, *BMC Medicine* (in press)

Costing nationwide HPV vaccine delivery in Low and Middle Income Countries using the WHO Cervical Cancer Prevention and Control Costing Tool: A case study of The United Republic of Tanzania, Raymond Hutubessy, Ann Levin, Susan Wang, Winthrop Morgan, Mariam Ally, Nathalie Broutet and Theopista John, *BMC Medicine* (in press)

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