

# Economic analyses of rubella and rubella vaccines: a global review

Alan R. Hinman,<sup>1</sup> Beryl Irons,<sup>2</sup> Merle Lewis,<sup>3</sup> & Kami Kandola<sup>4</sup>

**Objective** To investigate whether the incorporation of rubella vaccine into immunization programmes in developing countries is economically justified.

**Methods** A MEDLINE search was conducted for articles published between 1970 and 2000 that dealt with economic analyses of rubella and rubella-containing vaccines. The Eastern Mediterranean, South-East Asia, and Africa regional Index Medicus databases and the LILACS database for Latin America and the Caribbean were also searched.

**Findings** For developed countries, five cost–benefit analyses of rubella vaccine and five of measles–mumps–rubella vaccine as well as two cost–effectiveness analyses were found. For developing countries, five cost analyses and five cost–benefit analyses were found. All the cost–benefit analyses had a benefit:cost ratio greater than 1 and the cost–effectiveness studies indicated that rubella immunization was a cost-effective means of reducing the impact of congenital rubella syndrome. However, the methodologies were not standardized.

**Conclusion** The data support the inclusion of rubella vaccine in the immunization programmes of both developing and developed countries and indicate economic benefits comparable to those associated with hepatitis B vaccine and *Haemophilus influenzae* type b vaccine. More studies should be carried out on costs for care and immunization using standardized methodologies and locally obtained information.

**Keywords** Rubella syndrome, Congenital/prevention and control; Rubella vaccine/economics; Measles-mumps-rubella vaccine/economics; Immunization programs; Developed countries; Países en desarrollo; Cost-benefit analysis; Review literature (*source: MeSH, NLM*).

**Mots clés** Rubéole congénitale/prévention et contrôle; Vaccin antirubéoleux/économie; Vaccin antimorbillieux antiourlien antirubéoleux/économie; Programmes de vaccination; Pays développé; Pays en développement; Analyse coût-bénéfices; Revue de la littérature (*source: MeSH, INSERM*).

**Palabras clave** Síndrome de rubéola congénita/prevenición y control; Vacuna contra la rubéola/economía; Vacuna contra el sarampión-parotiditis-rubéola/economía; Programas de inmunización; Países desarrollados; Países en desarrollo; Análisis de costo-beneficio; Literatura de revisión (*fuentes: DeCS, BIREME*).

Bulletin of the World Health Organization 2002;80:264-270.

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## Introduction

Typically, rubella is a mild illness. However, its public health importance arises from the ability of the rubella virus to cross the placental barrier and infect fetal tissue. This congenital rubella infection can cause fetal death or a constellation of anomalies, notably congenital heart defects, deafness, cataracts and mental retardation, known as congenital rubella syndrome (CRS), particularly if it occurs in the first trimester of pregnancy. Approaches have been described for assessing the impact of congenital rubella infection and establishing surveillance systems (1, 2).

Before the introduction of rubella vaccine, infection in most industrialized countries occurred during early childhood

and 85–95% of women were immune by the time they reached childbearing age. However, periodic epidemics occurred among children and spread to involve the small proportion of susceptible adult women, leading to epidemics of CRS. The last major epidemic of rubella in the USA was in 1963–64 and resulted in more than 13 000 fetal or neonatal deaths and in 20 000 infants being born with CRS. Similar epidemics have occurred in most other industrialized countries.

A comprehensive review of the literature revealed the incidence of CRS to be 0.5–2.2 per 1000 live births in developing countries during epidemics, which occurred every 4–7 years (3). This resembled the situation that had prevailed in industrialized countries during the pre-vaccine era. The

<sup>1</sup> Senior Consultant for Public Health Programs, Task Force for Child Survival and Development, 750 Commerce Drive, Decatur, GA 30030, USA (email: Ahinman@taskforce.org). Correspondence should be addressed to this author.

<sup>2</sup> Epidemiologist, Division of Vaccines and Immunization, Pan American Health Organization, Caribbean Epidemiology Centre, Port of Spain, Trinidad and Tobago.

<sup>3</sup> Manager, Division of Epidemiology, Caribbean Epidemiology Centre, Port of Spain, Trinidad and Tobago.

<sup>4</sup> Health Specialist, Asia Branch, Canadian International Development Agency, Hull, Quebec, Canada.

Ref. No. 01-1136

average age at infection in developing countries ranges from 2–3 years to 8 years. Serological data from 45 developing countries indicates a significant range in the susceptibility of women of childbearing age:  $\geq 25\%$  were susceptible in 12 of these countries, 10–24% were susceptible in 20 countries, and  $<10\%$  were susceptible in 13 countries. It is estimated that in 1996, a non-pandemic year, there were 110 000 cases of CRS in developing countries (4). The countries with the highest level of susceptibility among adult women are those in which the risk of epidemic rubella and CRS may be greatest.

Case series studies in the USA (5) and Panama (6) showed that approximately 70% of patients with CRS had cardiac abnormalities, 60% had low birth weight, and 45% had cataracts. However, there was a substantial difference in the proportions with hearing loss, i.e. 60% in the USA and 35% in Panama, possibly because of underdiagnosis in Panama and because infants there were only followed up for 1 year, whereas most cases of deafness are not detected until children are aged 2–3 years.

Rubella vaccine confers long-lasting, probably lifelong, immunity following a single dose at 12 months of age or later. The question arises as to whether it should be included in the routine immunization schedule for children. In this connection it should be borne in mind that rubella vaccine is readily combined with measles and mumps vaccines. The question is complicated by the fact that the goal of immunization is to prevent congenital rubella infection rather than to prevent illness in young children. If a childhood rubella immunization programme fails to achieve high coverage, i.e. exceeding 80%, the epidemiology of the disease may change, resulting in reduced transmission in childhood and an increased number and proportion of women who are still susceptible when they reach childbearing age.

Conceivably, an inadequate programme of childhood immunization could make the situation worse. A rational approach to preventing congenital rubella infection entails both protecting women of or near childbearing age and immunizing children in order to curtail transmission (7). WHO has recommended the following approaches for countries wishing to prevent the occurrence of congenital rubella infection, including CRS (8, 9): prevention of CRS only by immunization of adolescent girls and/or women of childbearing age; or elimination of rubella as well as CRS by universal vaccination of infants, surveillance, and assuring immunity in women of childbearing age.

A summary of the current situation has recently been published (10) with reference to the CRS disease burden, vaccine uptake, and a WHO meeting on the prevention of CRS held in January 2000 (8).

Since rubella vaccine adds to the cost of immunization, and additional efforts are required to ensure that women of childbearing age are protected, concerns about the cost–benefit and cost–effectiveness of rubella vaccination assume considerable importance. These concerns may be heightened because many of the benefits of rubella vaccination of children occur after adulthood has been reached, rather than relatively quickly, as with measles or polio vaccines. Furthermore, the elimination of rubella may require the vaccination of adolescent and adult males as well as females in order to ensure that transmission is interrupted. In this paper we review information on the economic aspects of rubella and rubella-containing vaccines and make suggestions for future investigations.

## Methods

A MEDLINE search for articles published in any language since 1970 on economic analyses of rubella or rubella-containing vaccines was carried out in April 2000. The Eastern Mediterranean, South-East Asia and Africa regional Index Medicus databases and the LILACS database for Latin America and the Caribbean were also searched, and unpublished WHO reports were also examined. This paper considers only studies that covered widespread immunization with rubella-containing vaccine and which contained original calculations. Studies that addressed narrow policy issues, such as the screening and immunization of health care personnel, were not included (11).

## Results

The review of published papers and programme documents found 22 studies, including five cost–benefit analyses (CBAs) of rubella vaccine, five CBAs of measles–mumps–rubella (MMR) vaccine and two cost–effectiveness analyses in developed countries. In developing countries, five cost analyses and five CBAs were found. See Table 1.

### Cost–benefit analyses in developed countries

**Denmark.** Bjerregaard (12) estimated a benefit:cost (B:C) ratio of 3.2 for the use of MMR vaccine in a two-dose regimen covering all 15-month-old and all 12-year-old children over a period of 20 years in Denmark. The B:C ratio of individual components of the vaccine was not considered.

**Finland.** Elo (13) considered the costs and benefits of rubella vaccination in Finland, using a 30-year period as the time frame. Several different strategies were examined, including: the vaccination of all 13-year-old girls and postpartum women (B:C = 10.3); the vaccination of all 1-year-old children (B:C = 5.8); and the vaccination of all children aged 1–13 years followed by the vaccination of all 1-year-old children (B:C = 3.3).

**Norway.** Stray-Pedersen (14) considered the use of rubella or MMR vaccines in Norway in two strategies: the vaccination of all girls at approximately 15 months of age (B:C = 3 for rubella vaccine and B:C = 5 for MMR vaccine); and the vaccination of all 13-year-old girls (B:C = 6) or only susceptible 13-year-old girls (B:C = 11). The higher B:C ratio for the vaccination of older girls arose primarily because the benefits were seen sooner, i.e. upon reaching childbearing age. Other supplementary strategies were considered. None involved vaccinating all young children, i.e. both males and females.

**USA.** Schoenbaum et al. (15) assessed the B:C ratios of four different strategies for vaccination with monovalent rubella vaccine in the USA, assuming 80% compliance: the vaccination of 2-year-old children (B:C = 8); the vaccination of 6-year-old children (B:C = 9); the vaccination of 12-year-old females (B:C = 25); and the vaccination both of 2-year-old children of both sexes and of 12-year-old females (B:C = 8). Although the last-mentioned strategy did not have the highest B:C ratio, it had the greatest impact, reducing expected natural rubella infections by 80% and congenital rubella infections by 95%. The use of combined measles–rubella vaccine would have increased the overall B:C ratio of vaccinating 2-year-old children of both sexes to 23, reflecting the additional high return from measles vaccination; for vaccinating 2-year-olds and 12-year-old females the use of the combined measles–rubella vaccine would have increased the B:C ratio to 16.

Table 1. Cost, cost–benefit and cost–effectiveness analyses of rubella-containing vaccines

Reference	Country	Results <sup>a</sup>	Comments
Cost–benefit analyses in developed countries			
Bjerregaard (12)	Denmark	B:C ratio 3.2 for MMR two-dose programme over 20 years (1990)	Did not consider monovalent vaccines
Elo (13)	Finland	B:C ratios 10.3, 3.3 and 5.8 respectively for vaccinating all 13-year-old girls and postpartum women with rubella vaccine, vaccinating all children 1–13 years of age followed by vaccination of 1-year-olds, and vaccinating 1-year-olds only over 20 years (1979)	Also considered other strategies
Stray-Pedersen (14)	Norway	B:C ratios 3 and 5, respectively, for vaccinating 1-year-old girls with rubella or MMR; B:C ratios 5 and 11, respectively, for vaccinating 13-year-old girls with rubella or MMR (1982)	Also considered other strategies, none of which included vaccinating males
Schoenbaum et al. (15)	USA	B:C ratios 8 for vaccinating all 2-year-olds with rubella, 9 for 6-year-olds, 27 for 12-year-old girls, 8 for all 2-year-olds plus 12-year-old girls. Using combined measles-rubella vaccine the B:C ratios were 23 for vaccinating all 2-year-olds and 16 for vaccinating all 2-year-olds plus 12-year-old girls (1976)	
White et al. (16)	USA	B:C ratio 7.7 for rubella vaccination of 1-year-olds; 14.4 for MMR (1985)	
Hatziandreu (17)	USA	B:C ratio 11.1 for rubella vaccination of 1-year-olds; 21.3 for MMR (1994)	Used same approach as White et al. (16)
Cost–effectiveness analyses in developed countries			
Chapalain (18)	France	FF 15 500 per life saved without long-term disability by giving rubella vaccine to 13-year-old girls and women working in children's communities (1978)	
Gudnadottir (19)	Iceland	Screening women and teenage girls with vaccination of susceptibles (with continued vaccination of susceptible 12-year-old girls) was more cost-effective than vaccination of all children (1985)	
Cost analyses in developing countries			
de Owens (6)	Panama	Annual cost to treat a CRS case: US\$ 2291 (1989)	
Kommu (20)	Barbados	Lifetime cost to treat a CRS case: ca. US\$ 50 000 (1997)	
Kandola (21)	Guyana	Lifetime cost to treat a CRS case: US\$ 63 990 (1997)	
Robinson (22)	Jamaica	Annual cost to treat CRS case: US\$ 13 482 (1997)	
Cost–benefit analyses in developing countries			
Berger (24)	Israel	B:C ratio 1.1–1.7 for routine mumps/rubella immunization of 1-year-olds on basis of reported cases, $\geq 5.8$ for true incidence (1990)	Only addressed acute rubella, not CRS
Golden (25)	Israel	B:C ratio more reliably $>1$ for vaccinating pubertal females than vaccinating all children; B:C ratio $<1$ for vaccination of adult females	
Kommu (20)	Barbados	B:C ratio 4.7 for elimination initiative in addition to routine MMR immunization of 1-year-olds (1997)	
Kandola (21)	Guyana	B:C ratio 38.8 for eradication campaign in addition to routine MMR immunization of 1-year-olds; US\$ 1633/CRS case prevented (1997)	
Irons (27)	Caribbean	B:C ratio 13.3 for elimination campaign in addition to routine MMR immunization of 1-year-olds 1997–2017; US\$ 2900/CRS case prevented for English-speaking Caribbean and Suriname (1998)	

<sup>a</sup> B:C = benefit-to-cost ratio.

White et al. (16) compared the estimated morbidity, mortality, and costs attributable to measles, mumps and rubella with or without a childhood immunization programme. They estimated a B:C ratio of 7.7 for administering a single dose of rubella vaccine to all children. The use of MMR vaccine would have given an overall B:C ratio of 14.4. Hatziandreu et al. (17) used a similar approach to update the analysis on the basis of conditions in 1992. They estimated a B:C ratio of 11.1 for a single dose of rubella vaccine given to all children if both direct and indirect costs

were included. For MMR vaccine the overall B:C ratio would have been 21.3.

#### Cost–effectiveness analyses in developed countries

**France.** Chapalain (18) considered the cost–effectiveness of different strategies for reducing disabilities arising from perinatal events in France. The results indicated that over the course of 15 years, rubella immunization of 13-year-old girls and women working in children's communities would have prevented 2000 deaths and 1000 cases of disability at a cost of

FF 15 500 per life saved without long-term disability. This cost-effectiveness was higher than that of several other interventions, including resuscitation in labour rooms, antenatal and delivery supervision, and intensive neonatal care.

**Iceland.** Gudnadottir (19) considered the cost-effectiveness of strategies for preventing congenital rubella infections in Iceland. The systematic screening of women and teenage girls, and the vaccination of susceptibles (with continued vaccination of susceptible 12-year-old girls) would have been more cost-effective than vaccinating all children, given the social, medical and economic circumstances in the country. Both strategies were cost-effective, i.e. they achieved the desired results at an acceptable cost.

### Cost analyses in developing countries

**Americas.** Five cost analyses of rubella/CRS in developing countries in the Americas were found. Saad de Owens & Tristan de Espino (6) estimated the annual cost of treating a CRS case in Panama to be US\$ 2291 in 1989.

Kommu & Chase (20) estimated that the lifetime cost for treating a child with CRS in Barbados would be approximately US\$ 50 000 and that lifetime costs of treating CRS cases from 1997 to 2012 in the absence of rubella immunization would exceed US\$ 5.2 million. In Guyana, Kandola (21) estimated that the lifetime cost for treating a case of CRS would be US\$ 63 990 and that the lifetime costs for caring for existing CRS cases and those occurring between 1992 and 1997 would amount to US\$ 1.9 million. Robinson (22) estimated that in Jamaica in 1997 the annual cost of treating a CRS case was US\$ 13 482.

For the English-speaking Caribbean and Suriname<sup>a</sup> Irons et al. (23) estimated that, in the absence of increased immunization activities, approximately 1500 cases of CRS would occur between 1997 and 2012, incurring treatment costs in excess of US\$ 60 million. The lifetime costs of treating a single CRS case (US\$ 50 000–64 000) should be contrasted with the estimated figure of at least US\$ 300 000 in the USA during the 1980s.

### Cost-benefit analyses in developing countries

Five cost-benefit analyses of rubella-containing vaccine used in developing countries were found, all from countries where immunization coverage with measles-containing vaccine was at least 80%. No study compared a situation in which rubella vaccine was not used with one in which it was used. In each instance, rubella vaccine was already in use in some population groups.

**Israel.** Berger et al. (24) considered routine immunization of 1-year-olds with mumps-rubella vaccine in addition to the existing programme that delivered rubella vaccine to all 12-year-old girls. On the basis of reported cases, a B:C ratio of 1.1–1.7 was estimated; however, an estimate of at least 5.8 was made on the basis of the true incidence of disease. Since the existing programme theoretically prevented all or most CRS cases, costs/savings associated with such infection were not considered. The B:C ratio essentially only related to costs/savings associated with mumps and rubella in children, and included both direct and indirect costs. The majority of

the savings, both direct and indirect, were associated with mumps rather than rubella.

Golden & Shapiro (25) considered the B:C ratios for three approaches to the prevention of an anticipated rubella epidemic in 1984: the vaccination of all children; the vaccination of all pubertal females; and the vaccination of susceptible adult females. They considered annual B:C ratios in selected years between 1984 and 1995, thus the long-term benefit of the protection of women of childbearing age as a result of their vaccination when they had been children did not enter into the calculations. Their analysis suggested that the vaccination of pubertal females would have produced a somewhat more reliably positive B:C ratio over the 12 years than the vaccination of all children, and that the vaccination of adult women would have produced a consistently negative B:C ratio.

**English-speaking Caribbean and Suriname.** In the English-speaking Caribbean and Suriname, a major initiative was undertaken to eliminate measles using a four-pronged strategy (26): a mass catch-up vaccination campaign targeting all children aged 9 months to 14 years; high coverage ( $\geq 95\%$ ) with routine keep-up measles vaccination; periodic follow-up campaigns targeting all children aged 1–4 years approximately every four years in order to prevent the accumulation of susceptibles; and improvement of surveillance for monitoring progress.

The catch-up campaign, conducted in 1991, reached approximately 92% of the target population. Twelve of the 19 countries used MMR vaccine during this campaign and ten used MMR in the 1996 follow-up campaign. By 1997 all countries were using MMR vaccine for routine infant immunization. Against this backdrop, estimates were made of the cost of undertaking a rubella eradication initiative, given that cases of congenital rubella infection would continue to occur for several years, i.e. until the cohort of vaccinated children was old enough to comprise the entire childbearing age cohort aged 15–39 years. One of the principal activities of an eradication initiative would be a mass campaign to administer rubella vaccine to all previously unvaccinated males and females aged 1–30 years, using MMR vaccine for those aged 1–14 years and monovalent rubella vaccine for those aged 15–30 years. The exact target group in each country varied in accordance with previous immunization patterns.

In Barbados it was estimated that the cost of an elimination initiative for the period 1997–2012 would be US\$ 1.1 million compared with an estimated cost of US\$ 5.2 million for treatment of CRS cases in the absence of the initiative, i.e. a B:C ratio of 4.7 (20). In Guyana it was estimated that an eradication campaign would cost US\$ 465 300 and would result in long-term financial savings of US\$ 18 059 700 (without discounting), leading to an estimated B:C ratio of 38.8 and a cost-effectiveness ratio of US\$ 1633 per CRS case prevented (21).

For the English-speaking Caribbean and Suriname as a whole it was estimated that implementation of the additional strategies to interrupt rubella transmission and prevent the occurrence of CRS between 1997 and 2017 would cost approximately US\$ 4.5 million. The estimated cost of treatment was in excess of US\$ 60 million, suggesting a B:C

<sup>a</sup> Anguilla, Antigua and Barbuda, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Monserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, and the Turks and Caicos Islands.

ratio of 13.3. It was further estimated that, on average, it would cost US\$ 2900 to prevent a case of CRS (27). This amount reflects efforts over and above initial catch-up activities and continuing routine immunization of infants with MMR vaccine, which had already been instituted.

## Discussion

Economic evaluations are useful to governments seeking to assess where the investment of limited resources can lead to the greatest possible economic benefit. A cost–benefit analysis typically assigns a monetary value to all costs and all benefits. In carrying out such an analysis for an immunization programme, the costs of the intervention are subtracted from the direct and indirect monetary benefits gained from preventing a particular number of cases or deaths. This yields the net financial savings without discounting. The costs of the programme include at least the following elements: vaccines, syringes and their disposal, the cold chain, logistics, human resources, social mobilization, transport, surveillance, and quality control. These costs may be fairly consistent from one place to another.

There may be greater variability in estimates of the costs saved by cases prevented, which include direct financial savings from health care visits and diagnostic investigations, the purchase of pharmaceuticals, special schooling, the surgical repair of congenital heart defects, the removal of cataracts, and other items. Indirect costs may include the loss of lifetime earning potential, attributable, for example, to irreversible blindness, congenital deafness, intractable seizures, mental retardation and/or premature death, and the loss of the potential wages of children's carers.

It is difficult to make intercountry comparisons in this respect because the costs of health care and the monetary value of lost human productivity vary widely among countries. Nonetheless, if a standardized methodology is used, cost–benefit analysis is a valid instrument for making intracountry comparisons between different health interventions.

A cost–benefit analysis may be summarized as a benefit-to-cost ratio, where savings from an intervention are divided by the costs of the intervention. This approach was adopted in most of the published studies examined in this review. However, the ratio only indicates the relative sizes of costs and benefits — it does not reveal their absolute magnitudes.

Studies in developed countries compared a situation in which rubella vaccine was not used with one in which it was. In contrast, the studies in developing countries considered the incremental benefits and costs of additional strategies for the use of rubella vaccine against the current situation in which rubella vaccine was being given to some population groups.

All the industrialized countries had well-established immunization programmes and well-developed programmes for the care and rehabilitation of persons with CRS. All the studies in these countries included both indirect and direct costs, although there were significant differences in other aspects of methodology, including those relating to discount rates. In the developing countries, where treatment and rehabilitative services were not always available and the costs of care were not as high, the economic factors could be quite different. Moreover, the methodologies were not standardized and some studies did not include indirect costs, e.g. lost wages. All of these factors make intercountry comparisons difficult. However, the consistency of the findings is reassuring.

The B:C ratios for rubella vaccination in developing countries indicate an excess of benefits comparable to those estimated for the use of hepatitis B vaccine or *Haemophilus influenzae* type b (Hib) vaccine in these countries (Table 2). All three vaccines are clearly cost-saving. Liu et al. (28) estimated a B:C ratio of 42–48 for routine hepatitis B immunization of infants in Jinan City, China. Ginsberg et al. (29) estimated that neonatal hepatitis B vaccination in Israel would have a B:C ratio of 2.8. B:C ratios of 1.7, 1.5 and 1.3–1.4 were estimated for Hib vaccination in Santiago (Chile), Israel, and Cape Town by Levine et al. (30), Ginsberg et al. (31) and Hussey et al. (32), respectively.

Because the estimates from the Caribbean were based on a situation in which there was already significant use of rubella vaccine, they may have given an incomplete estimate of the true B:C ratio of rubella vaccination. They incorporated neither the costs nor the benefits of continuing rubella vaccination of children, which was already taking place. However, it seems unlikely that a more complete assessment of the costs and benefits of rubella vaccination would result in a B:C estimate of less than 1.

In April 1988 the Council of Human and Social Development of CARICOM resolved that every effort would be made to eliminate rubella and prevent the occurrence of new cases of congenital rubella syndrome in the Caribbean community by the end of the year 2000.

WHO has made the following recommendations (8).

- Countries undertaking measles elimination should take the opportunity to eliminate rubella through the use of measles–rubella or MMR vaccine in their childhood immunization programmes, as well as through campaigns. All countries undertaking rubella elimination should ensure that women of childbearing age are immune and that routine coverage in children is sustained at 80% or above.
- Countries that currently include rubella in their childhood immunization programmes should ensure that women of childbearing age are immune and should move towards rubella elimination.
- If a global measles eradication goal is established, rubella should be included.
- Rubella vaccine should be considered as a priority for initiatives to introduce new or underutilized vaccines in developing countries, e.g. those of the Global Alliance for Vaccines and Immunization and the Gates Children's Vaccine Programme.

Table 2. B:C ratios<sup>a</sup> for selected vaccines in developing countries

Vaccine	Reference	Country/area	B:C ratio
MMR <sup>b</sup>	Kommu (20)	Barbados	4.7
	Kandola (27)	Guyana	38.8
	Irons (27)	Caribbean	13.3
Hepatitis B	Liu (28)	China	42–48
	Ginsberg (29)	Israel	2.8
Hib <sup>c</sup>	Levine (30)	Chile	1.7
	Ginsberg (31)	Israel	1.5
	Hussey (32)	South Africa	1.3–1.4

<sup>a</sup> See footnote a, Table 1.

<sup>b</sup> Measles–mumps–rubella.

<sup>c</sup> *Haemophilus influenzae* type b.

## Conclusion

The economic data support the inclusion of rubella vaccine in the immunization programmes of both developing and developed countries and indicate economic benefits comparable to those derived from the use of hepatitis B vaccine and Hib vaccine. The reported range of estimates of cost–benefit and cost–effectiveness reflects variations in both methodology and local costs. It is desirable to have additional analyses performed on the basis of data on the burden of rubella and CRS in developing countries and

standardized analytical techniques (33, 34). Such analyses would further inform discussion about the appropriate introduction of rubella vaccine and the potential for major progress against both measles and rubella through the use of combined vaccines. ■

## Acknowledgement

This review received support from the World Health Organization's Department of Vaccines and Biologicals.

Conflicts of interest: none declared.

## Résumé

### Analyses économiques de la rubéole et des vaccins antirubéoleux : le point au niveau mondial

**Objectif** Rechercher si l'introduction du vaccin antirubéoleux dans les programmes de vaccination des pays en développement se justifie sur le plan économique.

**Méthodes** Une recherche sur MEDLINE a été effectuée pour les articles publiés entre 1970 et 2000 qui traitent des analyses économiques de la rubéole et des vaccins antirubéoleux ou à composante antirubéoleuse. Une recherche sur les bases de données de l'Index Medicus pour la Méditerranée orientale, l'Asie du Sud-Est et l'Afrique ainsi que sur la base de données LILACS pour l'Amérique latine et les Caraïbes a également été effectuée. **Résultats** Pour les pays développés, cinq analyses coût-avantages portant sur le vaccin antirubéoleux, cinq sur le vaccin rougeole-oreillons-rubéole et deux analyses coût-efficacité ont été trouvées. Pour les pays en développement, cinq analyses de coût et cinq

analyses coût-avantages ont été trouvées. Toutes les analyses coût-avantages indiquaient un rapport bénéfice/coût supérieur à 1 et les études coût-efficacité montraient que la vaccination contre la rubéole était un moyen de bon rapport coût-efficacité pour réduire l'impact du syndrome de rubéole congénitale. Les méthodologies n'étaient toutefois pas normalisées.

**Conclusion** Les données plaident en faveur de l'introduction du vaccin antirubéoleux dans les programmes de vaccination des pays en développement comme des pays développés et font ressortir des avantages économiques comparables à ceux qui sont associés au vaccin anti-hépatite B et au vaccin anti-*Haemophilus influenzae* type b. Il faudra réaliser des études supplémentaires sur le coût des soins et de la vaccination en utilisant des méthodologies normalisées et des informations de source locale.

## Resumen

### Análisis económicos de la rubéola y de las vacunas antirrubéólicas: examen mundial

**Objetivo** Determinar si la incorporación de la vacuna antirrubéolica a los programas de inmunización de los países en desarrollo está justificada desde el punto de vista económico.

**Métodos** Se realizó en MEDLINE una búsqueda de los artículos publicados entre 1970 y 2000 en los que se hicieran análisis económicos de la rubéola y de las vacunas con componente contra esta enfermedad. Se buscó asimismo en las bases de datos del Index Medicus para el Mediterráneo oriental, Asia sudoriental y África, así como en la base de datos LILACS para América Latina y el Caribe.

**Resultados** En lo que respecta a los países desarrollados, se identificaron cinco análisis costo-beneficio de la vacuna antirrubéolica y cinco de la vacuna contra el sarampión, la parotiditis y la rubéola, así como dos análisis de costo-eficacia. En cuanto a los

países en desarrollo, se hallaron cinco análisis de costos y otros cinco de costo-beneficio. En todos los análisis de costo-beneficio se observaba una relación beneficio/costo superior a 1, y los estudios de costo-eficacia mostraban que la inmunización antirrubéolica era una medida costoeficaz para reducir el impacto del síndrome de rubéola congénita. Sin embargo, las metodologías no estaban normalizadas.

**Conclusión** Los datos apoyan la inclusión de la vacuna antirrubéolica en los programas de inmunización de los países, tanto desarrollados como en desarrollo, y muestran unos beneficios económicos comparables a los asociados a las vacunas contra la hepatitis B y contra *Haemophilus influenzae* tipo b. Es necesario llevar a cabo nuevos estudios de los costos de la atención y la inmunización basados en metodologías normalizadas y en información local.

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