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Estimation of "needs" and "probable uptake" for HIV/AIDS preventive vaccines based on possible policies and likely acceptance (a WHO/UNAIDS/IAVI study)

José Esparza [a,*], Marie-Louise Chang [a], Roy Widdus [b], Yvette Madrid [c], Neff Walker [d], Peter D. Ghys [d]

[a] *WHO-UNAIDS HIV Vaccine Initiative, Health Technology and Pharmaceuticals, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland*

[b] *Access Project, International AIDS Vaccine Initiative, ICC, Block G, 3rd Floor, 20 Route de Pre-Bois, 1215 Geneva 15, Switzerland*

[c] *Access Project, International AIDS Vaccine Initiative, 30 Rue de la Gabelle, 1227 Carouge, Geneva, Switzerland*

[d] *United Nations Programme on HIV/AIDS (UNAIDS), 20 Avenue Appia, 1211 Geneva 27, Switzerland*

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Abstract

Once an effective HIV vaccine is discovered, a major challenge will be to ensure its world wide access. A preventive vaccine with low or moderate efficacy (30–50%) could be a valuable prevention tool, especially if targeted to populations at higher risk of HIV infection. High efficacy vaccines (80–90%) could be used in larger segments of the population.

Estimated "needs" for future HIV vaccines were based on anticipated policies regarding target populations. Estimated "needs" were adjusted for "accessibility" and "acceptability" in the target populations, to arrive at an estimate of "probable uptake", i.e. courses of vaccine likely to be delivered. With a high efficacy vaccine, global needs are in the order of 690 million full immunization courses, targeting 22 and 69%, respectively, of the 15–49 years old, world wide and in sub-Saharan Africa, respectively. With a low/moderate efficacy vaccine targeted to populations at higher risk of HIV infection, the global needs were estimated to be 260 million full immunization courses, targeting 8 and 41%, respectively, of the world and sub-Saharan African population aged 15–49 years.

The current estimate of probable uptake for hypothetical HIV vaccines, using existing health services and delivery systems, was 38% of the estimated need for a high efficacy vaccine, and 19% for a low/moderate efficacy vaccine. Bridging the gap between the estimated needs and the probable uptake for HIV vaccines will represent a major public health challenge for the future. The potential advantages and disadvantages of targeted versus universal vaccination will have to be considered.

Keywords: Vaccines; HIV; AIDS

1. Introduction

A safe, highly effective and accessible preventive HIV vaccine represents the best long-term hope for controlling the HIV/AIDS pandemic, although its development has encountered a number of unprecedented scientific challenges [1,2]. Despite these uncertainties, a number of experimental vaccines are being developed in the laboratory, and many have already progressed to clinical trials. Two candidate vaccines based on the outer envelope protein of HIV-1 (gp120) of two different genetic subtypes of HIV-1 (B and E) are currently undergoing phase III efficacy evaluation in North America and Thailand, and the final results from these trials are expected within the next 1–2 years. At least one additional phase III trial, using a prime-boost regime (a canarypox-HIV vector followed by gp120), is being planned to start in 2003 in Thailand, with results expected by 2007.

Once an effective vaccine is developed, a major challenge for the international community will be to ensure its access to all populations in need, without unnecessary delays. For this, a number of actions need to be taken now, including the identification of policies and strategies for vaccine introduction and use in different communities, countries and regions. These policies should be based, among others, on the characteristics of the vaccine (including level of efficacy and cost), as well as on the epidemiological situation and availability of other preventive interventions in the different

* Corresponding author. Tel.: +41-22-7914392; fax: +41-22-7914865.
E-mail address: esparzaj@who.int (J. Esparza).

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communities or countries. Determination of policies and strategies is also essential to estimate needs and potential demand for future vaccines. Such estimates are critical to assure adequate supply and financing for future HIV vaccination programmes.

The World Health Organization (WHO), the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the International AIDS Vaccine Initiative (IAVI) have begun to address the issue of access to future vaccines. In June 2000, IAVI issued a blueprint outlining a comprehensive access strategy [3]. In October 2000, WHO and UNAIDS organized a consultation to identify specific steps to be taken to ensure future access to HIV vaccines [4]. One of the recommendations from the WHO-UNAIDS consultation was to explore with countries critical policy issues related to future use of HIV vaccines, and to initiate a process to obtain initial credible estimates of needs and probable uptake for future HIV vaccines. This paper reports on the results from a collaborative project jointly implemented in 2001 by WHO, UNAIDS and IAVI.

2. Methods

2.1. Regional workshops

Information on policy issues and initial estimates of needs and currently delivery capacity for HIV vaccines were obtained from four regional workshops convened by WHO-UNAIDS in collaboration with IAVI and several local organizations. The workshops took place between April and June 2001 in Florianópolis, Brazil (for Latin America and the Caribbean); Entebbe, Uganda (for Africa); Seoul, Republic of Korea (for Asia and the Pacific); and Geneva, Switzerland (for North America and Europe). Each workshop was attended by an average of 25 participants from the relevant region, representing several disciplines, including epidemiologists, immunization experts, national decision makers, and community representatives (participants listed in Appendix A). The outcome of these four consultations was reviewed by the WHO/UNAIDS/IAVI Secretariat and external experts and subsequently presented to the vaccine industry in a WHO-UNAIDS consultation held in November 2001.

2.2. Vaccine efficacy scenarios

After a general discussion on HIV vaccines and trials, workshop participants reviewed concepts related to potential vaccine-induced protection (e.g. protection against infection or protection against disease) and levels of efficacy (e.g. percentage of infections and/or disease prevented by vaccination). Two hypothetical scenarios of vaccine efficacy were considered: low/moderate (30–50%) and high (80–90%) efficacy. Levels of efficacy represented a combination of prevention of infection (sterilizing immunity) and prevention of disease (decrease in virus load in vaccines who subsequently become infected).

In both scenarios the following vaccine characteristics were assumed: that a full vaccination course will require three intramuscular injections during the first year; that the vaccine was safe, even for HIV-infected people, although it would not have any “therapeutic effect” if given to an HIV-infected person; and that the vaccine is effective against the HIV strain(s) circulating in the country or community where it is used.

It would have been ideal to examine vaccine demand through a range of cost, but this proved impractical given time constraints. It was decided to choose one scenario that removes vaccine affordability as a constraint to access, assuming that vaccines were provided to countries free of charge (due to external support), but that costs of vaccine distribution were borne by countries.

The subsequent brainstorming discussion served to identify potential strategies for the use of HIV vaccines of low/moderate and high efficacy in the context of the epidemiological situation in different countries and communities, and its possible co-ordination and complementation with other HIV preventive interventions. The approach used was to initiate the discussion focusing on a “pilot” country from which a large amount of information was available (i.e. Brazil, Uganda and Thailand), in order to later extend and adapt the conclusions to other countries in the region.

2.3. Estimating needs and probable uptake for HIV vaccines

Once the key policy issues were identified, participants engaged in calculations on needs and probable uptake for future HIV vaccines of either low/moderate or high efficacy. “Needs” was defined as the size of the target population that ideally could benefit from a future HIV vaccine, based on epidemiological considerations. “Probable uptake” was defined by a more realistic estimate of vaccine usage, influenced by its accessibility and acceptability by the target population.

Estimates for both scenarios were obtained through a sequential process. First, participants identified the target populations (specific groups at risk) in need of vaccination. For each of these groups estimates were made of the size of the populations. For age groups, 2001 estimates of population size were used [5]. Estimates of the size of groups at higher risk for each country were compiled prior to the regional workshops. These groups included men who have sex with men (MSM), men and women with sexually transmitted infections (STI) [6], female commercial sex workers (CSW), and injecting drug users (IDU). For countries where there were no estimates for these groups, regional averages were used to make an estimate for the country. In addition to these four groups, other groups where also considered (e.g. health care professionals, military recruits) and calculations

were made by using national estimates or estimates drawn for other sources.

Once the "needs" were established for each country, the probable uptake was calculated based on "accessibility" and "acceptability" by the target population. Accessibility was defined as the percentage of people in each group that could be reached by an existing service or organization through which the vaccine would be provided. Acceptability referred to the percentage of people accessed who would agree to be vaccinated and who would receive the recommended course of at least three doses of the vaccine (i.e. the potential drop-out rate is included here). The estimated global need for each of the two vaccine scenarios (low/moderate and high) was the sum of the groups that were identified as needing a vaccine. The estimated probable uptake was the total number of people in each group that had a need for a vaccine, corrected by accessibility and acceptability rates. Country-specific estimates were aggregated by region, for both efficacy scenarios.

2.4. Estimating needs for subtype-specific vaccines

At the present time it is not known what could be the relevance of HIV genetic subtypes in terms of vaccine-induced protection [7]. In this process, we assumed that the vaccine was effective against the strain(s) prevalent in the target populations. However, a scenario that must be considered for the estimation of needs is that vaccines could exhibit subtype specificity, protecting only against the HIV genetic subtype used to manufacture the candidate vaccine. For that reason needs estimates were also obtained for vaccines protecting only against the major envelope genetic subtypes of HIV-1 (A–E). The prevalence and incidence of different envelope subtypes of HIV-1 during 2000 has been estimated by WHO-UNAIDS [8] and that information was used to calculate the needs for subtype-specific vaccines. In regions where a single subtype predominates (representing more than 90% of all infections) the needs for the subtype-specific vaccine is equivalent to the overall HIV vaccine needs. In regions with more than one prevalent subtype (with individual subtype prevalence of more than 10%) it was assumed that the target population would need to be vaccinated with vaccines based on each of the prevalent subtypes, doubling or tripling the initial needs estimates if two or three subtypes were present in the population.

3. Results

3.1. Potential use of vaccines with low/moderate or high efficacy

Most participants in the regional workshops agreed that even a preventive HIV vaccine with low or moderate efficacy could be a valuable prevention intervention, especially if used in specific populations at higher risk of HIV infection. These populations, however, differed from region to region. In most regions, MSM, IDU and CSW were identified as potential beneficiaries of vaccines with low/moderate efficacy. STI patients were also identified as a potential target population for low/moderate efficacy vaccines in Latin America and Africa. Participants from Africa identified additional potential target populations for a low/moderate efficacy vaccine, including truck drivers, post-natal women and, in some areas with high HIV incidence, all adolescents and young adults (aged 15–24 years old), especially if other preventive interventions were not widely available in the community.

High efficacy vaccines could be used in larger segments of the population, including adolescents and young adults, health care workers, discordant couples (with respect to their HIV infection status), military recruits, and prisoners. Regional differences were evident, correlating with the severity of the epidemic and the relative success of other preventive interventions. This was particularly evident for Asia, the Pacific and Eastern Europe, where due to the generally low HIV prevalence, there was a reluctance to recommend mass vaccination programmes, especially with low efficacy vaccines.

3.2. Global and regional estimates of needs

If an HIV vaccine with low/moderate efficacy is initially targeted to populations considered at higher risk of HIV infection, the global need for such a vaccine was estimated to be 260 million full immunization courses (or individuals to be vaccinated) (Table 1). That estimate targets 8% of the total world population of those aged 15–49 years, although in some regions, such as sub-Saharan Africa, the estimated needs targets 41% of the population in the same age group. An immunization programme with a high efficacy vaccine would target a larger proportion of the population, with a total global estimate of 690 million immunization courses, targeting 22% of the world population aged 15–49 years, and 69% of that population in sub-Saharan Africa. The above-mentioned estimates represent the catch-up needs, where all target populations and age groups would be vaccinated within the first 5 years of a vaccination campaign. A maintenance programme to vaccinate new cohorts would follow this. Furthermore, the estimates reflect the current situation with regard to the capacity to deliver a vaccine to the target population and the likely acceptance within them. It is believed that over time the infrastructure to deliver a vaccine and the acceptance level will increase.

The difference between the estimates of needs for low/moderate and high efficacy vaccine (430 million full immunization courses) is because with a low/moderate efficacy vaccine most regions may consider vaccinating only individuals at higher risk of HIV infection, while with a higher efficacy vaccine both higher-risk and lower-risk populations would be vaccinated. Indeed, most regions suggested using a high efficacy vaccine for all young people, through school-based vaccination programmes. It is

Table 1
Regional estimates of need and probable uptake for HIV vaccines

Region	Adult population 15–49 (M)	Low/moderate efficacy			High Efficacy		
		Need (M)	Probable uptake (M)	%, Probable uptake (M)/ need (M)	Need (M)	Probable uptake (M)	%, Probable uptake (M)/ need (M)
Sub-Saharan Africa[a]	290	120	37	30.83	200	86	43.00
South and South-East Asia[b]	1000	89	4.3	4.83	140	32	22.86
Latin America[c]	260	34	2.6	7.65	120	28	23.33
North Africa and Middle East[d]	180	1.1	0.013	1.18	54	36	66.67
Eastern Europe and Central Asia[e]	210	0	0	0.00	50	37	74.00
Western Europe[f]	200	11	3.2	29.09	45	21	46.67
North America[g]	160	11	1.6	14.55	38	12	31.58
East Asia and Pacific[h]	830	0.22	0.04	18.18	27	1.5	5.56
Carribean[i]	18	2.4	0.41	17.08	8.5	2.3	27.06
Australia and New Zealand	12	2.5	0.098	3.92	5.9	2.6	44.07
Global total	3200	260	49	18.85	690	260	37.68

[a] Sub-Saharan Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Reunion, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

[b] South and South-East Asia: Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, East Timor, India, Indonesia, Iran (Islamic Republic of), Lao People's Democratic Republic, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Viet Nam.

[c] Latin America: (Central America) Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama. (South America) Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela.

[d] North Africa and Middle East: Algeria, Bahrain, Cyprus, Egypt, Iraq, Israel, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Morocco, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, Tunisia, Turkey, United Arab Emirates, Yemen.

[e] Eastern Europe and Central Asia: Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

[f] Western Europe: Albania, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovenia, Spain, Sweden, Switzerland, TFYR Macedonia, United Kingdom, Yugoslavia.

[g] North America: Canada, United States of America.

[h] East Asia and Pacific: China, Democratic People's Republic of Korea, Fiji, Hong Kong, Japan, Macao, Mongolia, Papua New Guinea, Republic of Korea.

[i] Caribbean: Bahamas, Barbados, Belize, Bermuda and Cayman Islands, Cuba, Dominican Republic, Guyana, Haiti, Jamaica, Netherland Antilles and Aruba, OECS, Suriname, Trinidad and Tobago.

noteworthy that participants analysing Eastern European and Asian countries indicated that a low-efficacy vaccine might not be used at all, not even in the groups at higher risk. Arguments in support of this policy included the fact that vaccines of low efficacy would not be acceptable to the health authorities, and the fact that low-efficacy vaccines would have only marginal effects in countries with very low HIV prevalence.

3.3. Estimates of probable uptake

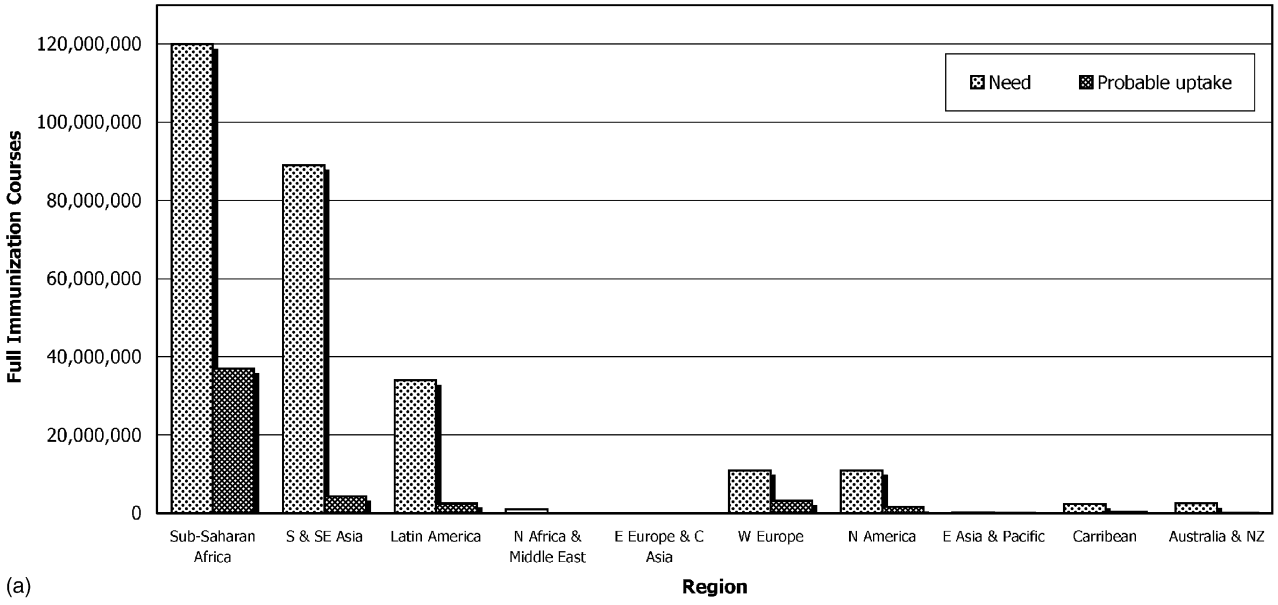
For a low/moderate efficacy vaccine, for which we estimated a need of 260 million full immunization courses, the probable uptake was estimated to be of only 49 million immunization courses, or 19% of the needs (Table 1). Likewise, for a high efficacy vaccine for which we estimated a need of 690 million immunization courses, global estimated probable uptake was of 260 million immunization courses, or 38% of the needs.

It is noteworthy that for a low/moderate efficacy vaccine the highest estimated probable uptake to need ratio was for sub-Saharan Africa (31%), while most other regions have relatively low ratios (Fig. 1). This higher ratio for Africa may reflect a perceived higher public health importance of an HIV vaccine and that the target population would be the general population rather than specific groups at higher risk.

The estimated probable uptake to need ratio for a high efficacy vaccine was significantly higher for most regions (from 23 to 74%), with the exception of East Asia and the Pacific (6%).

3.4. Estimates of needs for subtype-specific vaccines

While the global needs for a broadly protective vaccine of low/moderate and high efficacy were estimated to be 260 and 690 million immunization courses, respectively, the needs for individual subtype specific vaccines would be lower, depending on the geographical distribution and prevalence of the different HIV-1 subtypes (Table 2). On the other hand, because of the co-circulation of several HIV subtypes in different regions, the total number of immunization courses with subtype specific vaccines, perhaps used in combination, would be higher than with a broadly protective vaccine.



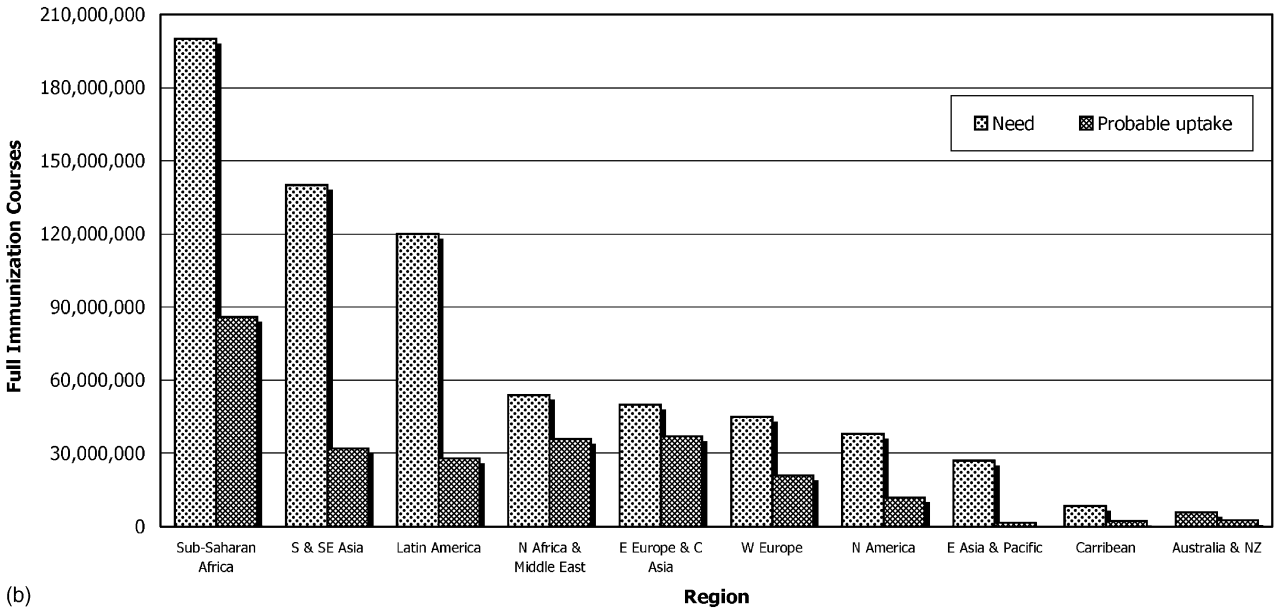


Fig. 1. Regional gap between estimated need and probable uptake of HIV vaccines: (a) low/moderate efficacy; (b) high efficacy vaccine.

Table 2
Estimated global need for subtype specific vaccines

Envelope (Env) subtype	Low/moderate efficacy (million)	High efficacy (million)
Env_A	94	270
Env_B	91	380
Env_C	82	140
Env_D	36	67
Env_E	30	61
Env_G	35	65
Total	370	990

For instance, the needs for a high efficacy subtype E-specific vaccine was estimated to be of 61 million full immunization courses because its use, at least with the present epidemiological situation, would be limited mostly to South East Asian countries. Likewise, a high efficacy subtype C-specific vaccine would be used in Southern Africa, the horn of Africa and India, with a total estimate of 140 million full immunization courses. The highest need estimate was for a high efficacy subtype B-specific vaccine (380 million full immunization courses), because of the presence of this particular subtype in several regions of the world, including some countries with the resources required to implement mass vaccination programmes.

4. Discussion

The results presented in this paper were obtained after extensive consultation with key informants from different regions of the world (Appendix A). It is appreciated, however, that workshop participants were not officially representing any country, nor were they making formal recommendations for future vaccine use. They were also aware that the estimates of needs and probable uptake were only preliminary figures, which will need to be validated or corrected with additional exercises conducted at the regional and country level.

Likely policies for use are difficult to predict because of uncertainties on vaccine characteristics, and policy makers are likely to err on the side of caution. Better information on the potential benefits may make use policies less conservative. A number of important issues emerged, the most important one being that future HIV vaccination programmes be fully integrated within the overall HIV/AIDS prevention. Vaccines were not considered as "magic bullets" against HIV/AIDS, but as an additional components of future comprehensive HIV/AIDS preventive packages. Two important additional findings were the moderate enthusiasm for the use of low/moderate efficacy vaccines (with the possible exception of sub-Saharan Africa), and a general preference for targeted vaccination of populations at high-risk of HIV infection.

Although the ultimate goal is to develop a highly effective HIV-1 vaccine that confers sterilizing immunity against all HIV strains, the most realistic scenario is the introduction of a first generation of HIV preventive vaccine that will only be partially protective. Our findings suggest that a low/moderate efficacy vaccine would be accepted by public health authorities, although it would most likely be recommended for populations at higher risk of HIV infection [9]. A high efficacy vaccine, however, would be more readily accepted and could gather more political support. This must be an incentive to continue research towards the ultimate goal of developing better products [10].

Although a targeted vaccination approach was often favored, the difficulties in accessing high-risk population were fully recognized. Additionally, a targeted vaccination strategy could result in stigmatization and discrimination of the populations selected for vaccination. An alternative strategy to be considered, is that of universal vaccination. An interesting point of comparison is with Hepatitis B immunization, where initial targeted strategies have largely been replaced by universal vaccination, which is now considered a more effective strategy, both from the economic and the public health point of view [11,12].

Another identified concern, especially regarding low efficacy vaccines, was the possibility of "behavioral reversals", resulting in higher HIV incidences in the target population [13]. This situation, however, has not been documented during the ongoing phase III HIV vaccine trials in North America and Thailand [14,15]. In any case, it would be essential to continue and strengthen general HIV prevention efforts during a vaccination programme.

The estimates of probable uptake of HIV vaccines, given current delivery systems and acceptance levels, represent only 19 and 38% of the targeted needs for vaccines of low/moderate and high efficacy, respectively. This is unsatisfactory and provides ample opportunities to expand the use of HIV vaccines even within the currently identified needs. Bridging the gap between what it is deliverable today and the estimated needs will be a critical public health challenge in the future. In some areas of the world, such as in Africa, the major reason for the difference between needs and probable uptake of vaccine could be the lack of appropriate delivery systems and infrastructures to bring the vaccine to the target populations. It is evident that there is an urgent need for donor agencies to allocate budgets to build up and strengthen infrastructures and systems, essential for future HIV vaccine introduction. Information is needed to define the minimum criteria required to have an operational health care infrastructure appropriate for HIV vaccination.

Acceptance can also be increased by education. Vaccination of adolescents requires the development of innovative strategies that are ethical, legal and logistically feasible. In other regions, the reason for the gap between needs and probable uptake of vaccines might be the perception that existing interventions are adequate, and that vaccination against HIV would not be cost effective. Country-specific studies are needed to validate or reject the above perceptions, and to better identify and develop country policies and vaccination strategies. Such a study has already been initiated in Thailand [16]. In this regard it is important to indicate that our analysis considered the present epidemiological situation in different regions of the world. It is possible, however, that HIV spread in Asia and the Pacific, or in other regions of the world, could increase the perceived need for a vaccine in those and other regions.

Although the relevance of the genetic variability of HIV-1 in terms of potential vaccine-induced protection is not known, this variability is perceived as an obstacle for the development of broadly protective vaccines [7]. It is believed that envelope based vaccines (such as gp120), aimed at inducing neutralizing antibodies, would be more subtype-specific than vaccines designed to induce cell-mediated immunity to more conserved epitopes of HIV. Our estimates for subtype-specific vaccines were made for individual vaccines, although it is recognized that antigens for different subtypes (or immunotypes) could be combined together on broadly protective cocktail vaccines. In any case, a subtype-specific vaccine would only be an intermediate step on HIV vaccine development because the ideal vaccine would need to protect against all HIV subtypes and strains. This would be an important goal both for individuals, who travel from region to region, and for communities, since the subtype distribution is very dynamic and it is continuously changing over time.

Our estimates were based on vaccine procurement and distribution by the public sector, and we did not explore the

potential private market, although a range of public/private financing and distribution mechanisms may be used by countries. It would be important to ensure that the private market in industrialized countries does not limit the availability and access to vaccines in developing countries, where more than 95% of all HIV infections are occurring [17].

It was also assumed that the vaccine would be provided at zero cost to certain countries, and that they would face distribution costs, although it is likely that some countries will receive substantial subsidies to strengthen their delivery systems. It is likely that a global immunization campaign would require substantial funding, which should be discussed in the context of the estimated US$ 9 billion per year estimated to be needed to mount an effective global response to the HIV/AIDS pandemic [18]. The present estimates were made without an a priori consideration of the capacity to produce the required number of doses, and a dialogue with industry is urgently required to ensure swift, world wide availability of the vaccines.

Future decisions about introduction and use of HIV vaccines will be based not only on vaccine efficacy, but also on the cost-benefit of vaccination, including costs associated with vaccine procurement and distribution and efficiency of existing preventive interventions. Since the introduction of an HIV vaccine, especially one with low efficacy, would have to be accompanied with intense social marketing and behavioral counselling, overall AIDS prevention and control costs will increase significantly, to account for the extra expenses related to vaccine procurement and distribution, and for the additional behavioral interventions which would have to be strengthened. We believe, however, that this extra investment in HIV/AIDS prevention and control would pay back after a few years, by implementing an effective campaign that will finally result in the interruption of the chain of transmission of the virus. That campaign will only succeed if communities are supportive and engaged.

Finally, when an effective HIV vaccine is discovered, the international community and the affected countries will have to make many critical decisions on how to use the vaccine. These decisions will have to be taken with a considerable degree of uncertainty, although mathematical modelling could provide useful insights [19–22]. For instance, several years will pass before definitive information regarding duration of protective immunity, or efficacy against different HIV-1 subtypes and strains, become available. Moreover, vaccine availability may be limited at the beginning, forcing national authorities to decide what populations should be prioritized for vaccination. Strategies for vaccine introduction should also consider the possibility of conducting selected phase IV effectiveness trials, to address the uncertainties about the practical generalizability of vaccine performance [23], although these trials should not be a bottleneck to early access to future HIV vaccines.

The numbers provided in this study should encourage donor agencies as well companies involved in HIV vaccine development, to plan for the budgets needed to be able to produce and distribute the necessary number of doses once an HIV vaccine is licensed.

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Appendix A. List of participants in the different consultations

A.1. Florianópolis, Brazil; 16–17 April 2001. Co-sponsored by the Brazilian AIDS Programme

Barros T	UNAIDS, Brazil
Brigido de Macedo LF	National AIDS Programme, Ministry of Health, Brazil
Camara B	Special Programme on STIs, Caribbean Epidemiology Centre, Trinidad and Tobago
Carvalheiro JR (Chair)	Institutes of Research, Sao Paulo, Brazil
Chateaubriand Domingues R	National Vaccine Committee, Brasilia, Brazil
de Moura Filho EA	National Programme on Immunization, Brazil
Girade H	UNAIDS Theme Group/UNICEF, Brazil
Greco DB	HIV Vaccine Center, Minas Gerais, Brazil
Irons B	Caribbean Epidemiology Centre, Trinidad and Tobago
Luna E	Faculty of Science, São Paolo, Brazil
do Valle Menezes A	Grupo Pela Vidda/RJ, Brazil (IAVI consultant)
de Oliva O (Co-chair)	Pan American Health Organization, Division of Vaccines and Immunization, USA
Nascimento MVL	National Programme on Immunizations, Brazil
Spink MJP	Catholic University of São Paulo, Brazil
Szwarcwald CL	Oswaldo Cruz Foundation Brazil
Weissenbacher M	National Reference Center on AIDS, Argentina
Yih K	Pan American Health Organization, Brazil

A.2. Entebbe, Uganda; 18–19 June 2001. Co-sponsored by the Uganda AIDS Commission

Asther A	World Health Organization, Uganda
Gershy-Damet G-M	Regional Office for Africa, World Health Organization, Zimbabwe
Jacobi J	UNAIDS, Uganda
Kihumuro Apuuli D (Chair)	Uganda AIDS Commission, Uganda
Kizza Mayanja H	Mulago Hospital and Makerere University, Uganda
Korukiiko Ndyomugyenyi L	Uganda AIDS Commission, Uganda
Makumbi I (Co-chair)	Expanded Program on Immunization, Ministry of Health, Uganda
Mbidde E	Uganda Cancer Institute, Uganda
Mugarura C	Ministry of Health, Uganda
Mugerwa R	Mulago Hospital and Makerere University, Uganda
Musinguzi J	AIDS Control Programme, Ministry of Health, Uganda
Mwesigwa Kindyomunda R	Uganda AIDS Commission, Uganda
Nielsen LE	International AIDS Vaccine Initiative, Uganda
Obodozie O (Co-chair)	National Institute for Pharmaceutical Research and Development, Nigeria
Omaswa F	Health Services, Uganda
Pallangyo K	Muhumbili Medical Centre, Tanzania
Rwomushana J (Co-chair)	Uganda AIDS Commission, Uganda
Sassan-Morokro M	Projet RETRO-CI, Côte d'Ivoire
Sekatawa E	Makere University, Uganda
Swaya W	Ministry of Finance, Uganda
Tafesse Y	Ethiopian Health and Nutrition Research Institute, Ethiopia
Walker O	World Health Organization, Uganda

A.3. Seoul, Republic of Korea, 4–5 June 2001. Co-sponsored by the International Vaccine Institute (IVI)

Acosta C	International Vaccine Institute, Republic of Korea
Clemens J (Chair)	International Vaccine Institute, Republic of Korea
Chitwarakorn A	Ministry of Public Health, Thailand
Gorna R	Australian Federation of AIDS Organizations, Australia
Hossain MM	International Vaccine Institute, Republic of Korea
Kilgore P	International Vaccine Institute, Republic of Korea
Lee J	National Institute of Health, Ministry of Health and Welfare, Republic of Korea
Kunanusont C	UNFPA Office for East and South East Asia, Thailand
Limpakarnjanarat K	Thai Ministry of Health-US Centers for Disease Control and Prevention (CDC) Collaboration, Ministry of Public Health, Thailand
Monzon O	AIDS Society of the Philippines, Philippines
Oh M-D	Seoul National University College of Medicine, Republic of Korea
Phoolcharoen W	Health Systems Research Institute, Ministry of Public Health, Thailand
Rugpoa S	Department of Communicable Disease Control, Ministry of Public Health, Thailand
van Seidlein, L	International Vaccine Institute, Republic of Korea
Sung YC	Department of Life Sciences, Pohang University of Science and Technology, Republic of Korea
Suraratdecha C	School of Economics, Sukhothai Thammathirat Open University, Thailand
Xu Z-Y	International Vaccine Institute, Republic of Korea
Yi Z	Institute of Virology, People's Republic of China

A.4. Geneva, Switzerland; 28–29 June 2001

Brunet J-B	Cellule d'appui Scientifique (C.A.S.), Direction Générale de la Santé, France
Casabona Barbarà J	Hospital Universitari Germans Trias i Pujol, Barcelona, Spain
Dehne KL	UNAIDS, Austria
van den Hoek JAR	Municipal Health Service, Amsterdam, The Netherlands
King K (Chair)	Communicable Disease Branch, Department of Health, UK
Kobyshcha Y	UNAIDS, Division for Europe and America, Austria
Kruglov Y	Ministry of Health, Ukraine
Mastro TD (Chair)	HIV Vaccine Section, Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, USA
Miller M	Fogarty International Center, National Institutes of Health, USA
Pokrovsky V	Russia AIDS Centre, Russia
Rezza G	Istituto Superiore di Sanità, Italy
Smolskaia T	North-Western District AIDS Centre of Russian Ministry of Health, Russia
Van den Boom F	European Policy, IAVI, The Netherlands

A.5. Geneva, Switzerland; 19–20 November 2001

Bartholow B	HIV Vaccine Section, Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, USA
Berger J	Aventis Pasteur, France
Van den Boom F	IAVI, The Netherlands
Casabona Barbarà J	Hospital Universitari Germans Trias i Pujol, Barcelona, Spain
Cunningham G	Merck Vaccine Division, Merck & Co. Inc., USA
Donnelly J	Chiron Research and Development, Chiron Corporation, USA
Ehreth J	Aventis Pasteur, France
Francis DP	VaxGen, USA
Gershy-Damet G-M	Regional Office for Africa, WHO, Zimbabwe
Gold D	IAVI, USA
Gordon L	VaxGen, USA
Hayashi C	WHO, Switzerland
van den Hoek JAR	Municipal Health Service, Department of Infectious Diseases, The Netherlands
Hombach J	GlaxoSmithKline, Belgium
Jaafar H	Morocco
King K	Communicable Disease Branch, Department of Health, Public Health Group, UK
LaSalvia T	Scientific Information and Program Planing, NIAIDS/Division of AIDS, NIH, Bethesda, USA
Limpakarnjanarat K	The Thai Ministry of Health-US Centers for Disease Control and Prevention Collaboration, Ministry of Public Health, Thailand
Longini I	Department of Biostatistics, the Rollins School of Public Health, Emory University, Atlanta, USA
do Valle Menezes A	Grupo Pela Vidda, Brazil
Miller M	Fogarty International Center, National Institutes of Health, USA
Milstien J (Co-chair)	World Health Organization (WHO), Switzerland
Mukasa-Monico S	International Council of AIDS Service Organizations, Canada
de Oliva O (Co-chair)	Pan American Health Organization/Pan American Sanitary Bureau, Division of Vaccines and Immunization, USA
Pallangyo K	Muhumbili Medical Centre, Tanzania
Phoolcharoen W	Health Systems Research Institute, Ministry of Public Health, Thailand
Shin S-I	VaxGen, USA
Vandermissen W	GlaxoSmithKline, Belgium
Xu Z-Y	International Vaccine Institute, Republic of Korea
Young P	AlphaVax Inc., USA

A.6. Secretariat

Chang M-L	WHO-UNAIDS HIV Vaccine Initiative/WHO, Switzerland
Esparza J	WHO-UNAIDS HIV Vaccine Initiative/WHO, Switzerland
Ghys PD	UNAIDS, Switzerland
Madrid Y	Access Project, IAVI, Switzerland
Nixon S	WHO-UNAIDS HIV Vaccine Initiative/WHO, Switzerland
Osmanov S	WHO-UNAIDS HIV Vaccine Initiative/WHO, Switzerland
Pattou-Markovic C	WHO-UNAIDS HIV Vaccine Initiative/WHO, Switzerland
Touré C	WHO-UNAIDS HIV Vaccine Initiative/WHO, Switzerland
Walker N	UNAIDS, Switzerland
Widdus R	Initiative on Public–Private-Partnerships for Health, Switzerland

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