CIGI JUNIOR FELLOWS
POLICY BRIEF
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KEY POINTS

- Meningitis epidemics are highly concentrated in a 25-country area of Sub-Saharan Africa known as the "meningitis belt" and result in an average of approximately 5,000 confirmed deaths in the region each year.
- A new, low-cost vaccine called MenAfriVac™, developed by an innovative international health alliance to specifically target the source of these epidemics, has been shown to be highly effective, with no new cases of meningitis reported in those who have received one dose of the vaccine.
- As the MenAfriVac™ vaccination campaign expands, three strategies are recommended that will bring the vaccine to hard-to-reach populations and ensure that its full potential is achieved. By employing these strategies and adapting them to local conditions, the MenAfriVac™ campaign will have the greatest chance of eliminating meningitis epidemics in Sub-Saharan Africa.
- These strategies focus on providing financial and in-kind incentives to individuals undergoing immunization, improving tracking and reporting mechanisms, and improving campaign effectiveness through social mobilization.

IMMUNIZATION STRATEGIES: ERADICATING MENINGITIS IN SUB-SAHARAN AFRICA

SARAH CRUICKSHANK AND SAMANTHA GRILLS

INTRODUCTION

Meningitis epidemics are a major concern in the 25-country area from Senegal to Ethiopia known as the "meningitis belt." A communicable disease, meningitis affects large portions of the population, causes high rates of death and disability, and worsens the plight of families and communities in a region marked by extreme poverty. MenAfriVac™ is the least expensive and longest lasting meningitis vaccine created to date, and is the best medicinal tool currently available to the global health community to combat this serious disease. Developed through a partnership between the Programme for Appropriate Technology in Health (PATH), an international non-governmental organization, and the World Health Organization (WHO), MenAfriVac™ targets the strain of bacterial meningitis responsible for the vast majority of outbreaks in the region. This vaccine is currently being widely distributed through Burkina Faso, Mali and Niger — and gradually expanding into other high-risk countries — and has the potential to save hundreds of thousands of lives if funding can be secured and appropriate strategies implemented.

This policy brief provides background on the concentration of the disease in Sub-Saharan Africa and on efforts to extend immunization coverage to all affected countries. It then discusses three kinds of strategies that can be implemented to ensure the maximum possible benefit is derived from the vaccine. Through the use of targeted policy

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strategies such as those recommended in this brief, the MenAfriVac™ vaccine can be made available to many more at-risk throughout Sub-Saharan Africa.

THE DISEASE AND ITS SPREAD IN SUB-SAHARAN AFRICA

Meningococcal meningitis is an infection of the thin lining surrounding the brain and spinal cord known as the meninges. Various strains of bacteria lead to meningitis outbreaks in different regions. Group A (MenA) is responsible for 80–85 percent of the cases in Africa, while Group C (MenC) is the dominant strain throughout much of the developed world (PATH, 2012). Over time, MenC has attracted the necessary political will and resources to become a fairly rare and far less destructive disease. MenA, however, continues to pose a significant health risk as one of the leading causes of mental retardation in Africa and the reason for over 100,000 deaths in the 1990s alone (Robbins et al., 2003: 747).

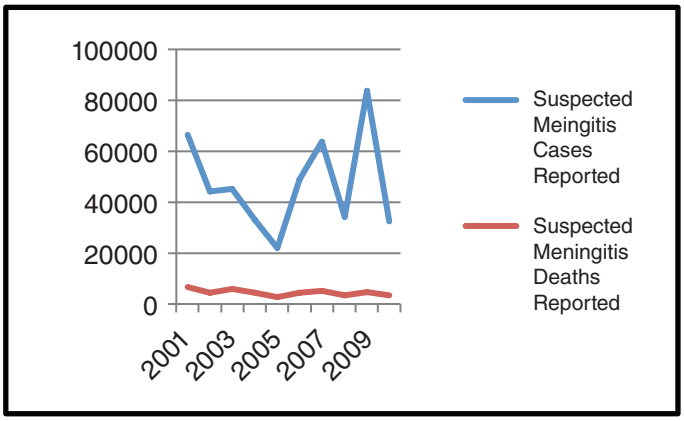
The leading cause of MenA in Sub-Saharan Africa is *Neisseria meningitidis*, a bacterium found at the back of the throat or in the nose of those infected. The bacterium is transmitted from person to person through respiratory or throat secretions. Close and prolonged contact with carriers facilitates the spread of the disease. Symptoms typically present themselves very suddenly; without immediate medical attention, the fatality rate can be as high as 50 percent, with most fatalities occurring within 24 to 48 hours of the onset of symptoms (PATH, 2012). Approximately 25 percent of those who survive the infection are left with significant after-effects, such as central nervous system injury and neurological disabilities (PATH, 2012).

For each case of meningitis in Sub-Saharan Africa, a household typically spends between US$90 to US$154 on

health care and lost wages — amounts that, on average, total over 34 percent of the annual gross domestic product per capita in this region (Colombini et al., 2009: 1520). The economic repercussions of meningitis are exacerbated by the fact that the disease targets young adults who would otherwise be acting as providers for the family unit. Like HIV/AIDS, malaria and other diseases that are also prevalent in Sub-Saharan Africa, meningitis often aggravates the deep impoverishment that is widespread in much of the region.

Meningitis epidemics occur in waves every five to 12 years, with the time between these waves shrinking in recent years due to changing climate patterns and longer dry seasons (LaForce et al., 2007: A97). The rates of suspected meningitis cases and deaths are illustrated graphically in Figure 1 for the years 2000–2010, according to data compiled by the WHO (2011a). The actual rates, however, are much greater than the official figures suggest due to such factors as the suddenness of death following infection, the difficulty of tracking and reporting cases in rural areas, and the fact that a medical diagnosis typically requires a costly lumbar puncture procedure (PATH, 2012).

FIGURE 1: MENINGITIS CASES IN SUB-SAHARAN AFRICA (2000-2010)



DEVELOPMENT AND DISTRIBUTION OF THE MENAFRIVAC™ VACCINE

MenA was allowed to continue without sufficient international action or attention until the advent of the Meningitis Vaccine Project (MVP), a joint venture founded in 2001 between the WHO, PATH and other international non-profit organizations created to help rectify this global health problem. Funded primarily by the Bill and Melinda Gates Foundation and the GAVI Alliance,[1] the MVP developed, tested and began to distribute MenAfriVac™ in 2010, to specifically target MenA epidemics. This innovative alliance is a clear example of the power of transnational public-private collaborations in the field of contemporary health initiatives, demonstrating the true potential for widespread disease eradication when resources and capacity are mobilized at the global level.

MenAfriVac™ is produced in 10-dose vials for greater efficiency in immunizing large populations — of particular benefit during emergency campaigns. The price per dose of US$0.40 also makes it affordable for families and countries in need (WHO, 2011a). This low price point was only achieved through international collaboration between companies in the Netherlands, the United States and India, which came together under the MVP to produce the vaccine well below the projected costs of traditional pharmaceutical companies. As a conjugate vaccine, MenAfriVac™ brings important health benefits through its longer-term effectiveness (10–20 years) and its ability to improve herd immunity[2] by preventing transmission of the disease (Burki, 2011: 19; Colombini et al., 2009: 1524). These attributes help to overcome the limitations of weak health care

1 A public-private partnership focused on increasing access to immunizations in poor countries.

2 This term refers to the reduction in infection rates among the population as a whole, through the immunization of a given group.

infrastructures, increasing the value of every injection both for the individual and the community.

Due to a combination of high outbreak risk and relatively strong health-system capacity, Burkina Faso, Mali and Niger were the first three countries to widely distribute MenAfriVac™. By the end of the 2010-2011 meningitis season, the lowest number of confirmed MenA cases ever observed during an epidemic was recorded, with these three countries reporting zero new cases in individuals who received one dose of the vaccine (PATH, 2012). Approximately 55 million people received MenAfriVac™ by the end of December 2011. If the campaign is able to maintain its current rate of funding and distribution, projections are that the vaccine will be introduced to over 250 million people in all 25 countries of the meningitis belt by 2016 (WHO, 2011b).

A child receives a meningitis vaccination on the opening day of a meningitis vaccination campaign in Niger. (AP Photo/MSF, Liane Cerminara, HO)

For the vaccine to be distributed across all regions of the meningitis belt, it is imperative that sufficient funding and the political will behind the campaign not wane in the coming years. The most recent estimate is that the continued introduction of the vaccine throughout the meningitis belt would require the mobilization of an additional US$375 million from donor governments and the international community — a relatively small amount in the field of global health (MVP, 2011). The economic benefit of MenAfriVac™ is further underlined by the fact that its widespread introduction could free up as much as US$300 million over the next 10 years, which would otherwise be spent on medical costs for diagnosis and treatment — and this does not include the untold socio-economic impact of saving lives and preventing disabilities (MVP, 2011).

RECOMMENDED STRATEGIES FOR REACHING IMMUNIZATION GOALS

Assuming that funding continues for vaccine production and distribution, governments in the region can make use of three broad strategies to ensure maximum coverage of their populations with the MenAfriVac™ vaccine: the provision of incentives to individuals for vaccination; improved tracking and reporting systems; and community involvement through social mobilization campaigns. Action in each of these policy areas will significantly increase the likelihood of achieving the objective of eliminating MenA epidemics in Sub-Saharan Africa.

PROVISION OF INCENTIVES

Offering individuals small incentives during immunization campaigns has been shown to increase vaccination rates, with even small incentives substantially changing behaviour at a low cost. Incentives can effectively turn an inconvenient task into a worthwhile activity, which results in a dramatic increase in vaccination coverage rates (Jameel, 2011: 4). There are several different types of incentive programs:

- Conditional cash transfers (CCTs) provide money to families conditional upon vaccination and are particularly effective among populations that are hard to reach with supply-side interventions (Barham and Maluccio, 2009: 611). CCTs act as human capital subsidies by providing individuals with monetary incentives to travel to health facilities (Barham and Maluccio, 2009: 612). A review of CCT programs in Latin America and Africa suggests that they are effective in increasing the use of preventive health services and are therefore helpful in reducing health inequities in low-income regions (Lagarde et al., 2007: 1900; 1908).

- Vouchers or coupons for food or medicine given out upon vaccination have been shown to not only increase coverage rates, but also to provide extra nutrition or much-needed medicine to those in need. A WHO program in Karachi, Pakistan, found that up-to-date immunization coverage of children increased two-fold in the incentive cohort, compared to the no-incentive cohort (Chandir et al., 2010: 3473). The parents of children being immunized could use these coupons for groceries or medicine at participating stores in close proximity to each vaccination centre (Chandir et al., 2010: 3474).

- In-kind transfers or incentives are when goods such as food or bed nets are given to families upon vaccination. A study in Udaipur, India, found that providing families with a one-kilogram bag of lentils and a small set of dishes upon vaccination of their children increased immunization rates six-fold, relative to the comparison group (Jameel, 2011: 1). A measles vaccination campaign in Ghana gave out insecticide-treated bed nets to families with children under five years of age upon vaccination. Not only did the bed nets act as an incentive for MenA immunization, but the related health goal of malaria reduction was also addressed — a double benefit.

The success of incentives shows that many individuals do not appear to object strongly to vaccinations. The incentives offered above were fairly small and unlikely to overcome any cultural or ideological objections to immunization. Rather, it is likely that the inducements provided offset the inconvenience and opportunity costs associated with travelling to a health clinic for immunization (Jameel, 2011: 1). Incentives upon vaccination represent a small cost to mass immunization campaigns but can make a critical difference in achieving immunization rates that are high enough to reduce the incidence of an illness, as has been the case for example with vaccination campaigns for diphtheria, pertussis and tetanus. The campaign in India found that even though incentives represented a cost to the program, this cost was more than offset by increased levels of efficiency, with the per-child cost of immunization ultimately being cut in half (Jameel, 2011: 4). The provision of small incentives in the MenAfriVac™ campaign would also allow difficult-to-reach populations to be immunized, creating greater health equity and higher vaccination rates.

TRACKING AND REPORTING

A significant obstacle to vaccine distribution in impoverished regions is the limited capacity of health care systems to maintain accurate tracking and reporting. From monitoring outbreaks of the disease to keeping track of those who have received, or are still in need of, the vaccine, up-to-date tracking and reporting is essential to the success of any immunization campaign. An increased focus on developing the capacity of local actors on the ground is, therefore, essential to ensuring that vaccination campaigns reach as many at-risk individuals as possible.

The meningitis belt is characterized by some of the highest rates of extreme poverty in the world. Consequently, any approach to combatting a meningitis outbreak must incorporate special considerations of the larger social, political and economic environment. It is precisely this widespread poverty that is the main inhibitor of accurate tracking and reporting methods. In impoverished areas, the issue of tracking and reporting can be greatly improved by emphasizing the training and education of health care workers on the ground, enabling transportation for workers into rural areas, encouraging school attendance of children, and using (where available) web and mobile communication networks. Each of these tools, used alone or in combination, will directly improve the outreach of the MenAfriVac™ campaign.

Better communication and transportation systems will not only result in enhanced tracking and reporting, but campaigns will become more egalitarian, efficient and cost-effective. Where communication and transportation systems are lacking, both health care workers and citizens in need of the vaccine have suffered. For example, although a policy was established for free MenAfriVac™ injections during a particularly pressing emergency campaign, without the reliable flow of information to workers on the ground in these hard-to-reach areas, many in need were unduly charged (Colombini et al., 2009: 1524). Rural and nomadic populations face particular barriers to vaccine access. In Mali, for example, 60 percent of health care workers are employed in Bamako, which accounts for only 12 percent of the country's population (PATH, 2012). With more reliable and efficient modes of transportation, health care workers can reach more of those in need outside of major villages and city centres, dramatically boosting immunization coverage. The extent to which such initiatives will be actively pursued is a policy issue in and of itself, however, and speaks to the problem of marginalization of rural populations more generally — something that can be improved, but not entirely overcome through efforts to provide increased access to health care and immunizations.

One of the most effective methods for conducting immunization campaigns for vaccines such as MenAfriVac™ is to distribute injections of the vaccine at schools. While using schools as injections sites can minimize opportunity costs for parents, it can produce problems in reaching children from particularly impoverished families, who may not be able to attend school, and can often result in gendered gaps in access. By providing incentives for greater school attendance for both boys and girls, advancements can be made in both vaccine distribution and in the broader struggles against poverty and gender discrimination. Lastly, by drawing on the advantages of web and mobile technologies as they are introduced, the MenAfriVac™ campaign will not only be better able to address uncertainties on the ground, but tracking and reporting will be made much more efficient through the sharing of centralized and up-to-date information.

SOCIAL MOBILIZATION

In communities where social mobilization activities were conducted, researchers found that individuals were consistently less likely to refuse vaccination, more likely to go to health clinics to be vaccinated and more likely to report positive attitudes towards vaccination (Obregón et al., 2009: 626). It is doubtful if MenA can be defeated without broad-based social mobilization campaigns involving local and national authorities, community leaders, professional organizations, religious leaders, the media and others agents of influence (Obregón et al., 2009: 625).

Mass vaccination campaigns such as MenAfriVac™ may be led, organized and supervised by staff, but often the number of formally trained health workers will be insufficient and, therefore, will need to be supplemented by volunteers mobilized through high-level and community advocacy (Aylward and Linkins, 2005: 270).[3] Collaboration with local health authorities and organizations is essential while marketing the campaign and distributing vaccines, in addition to engaging religious and community leaders, whose involvement can help to build public confidence and credibility in campaigns (Khan et al., 2005: 87; Obregón et al., 2009: 627).

A health campaign undertaken in Vietnam gives an indication of the social mobilization strategies that can be applied to the MenAfriVac™ campaign: local governments and non-governmental organizations met to review the management and goals of the project; local groups helped write operational plans and signed a commitment document clearly defining the roles and responsibilities of each party; local health workers were trained to administer the vaccinations; and volunteers attended training workshops and then conducted education and communication sessions in their communities (Khan et al., 2005: 88). Social mobilization promotes inter-sector consensus building around community health issues, and has been shown to lead to positive changes in health behaviour. In addition, research has shown that the participation of various organizations fosters increased civic cooperation and involvement in governance (Harkins et al., 2008: 15). Given that the meningitis belt in Sub-Saharan Africa covers a large and diverse area, engagement with local actors will help the campaign to adapt measures to fit local circumstances and incorporate local knowledge into service-delivery strategies (Aylward and Linkins, 2005: 272).

If social mobilization is conducted in a flexible, inclusive and bottom-up manner, with MenAfriVac™ representatives genuinely engaging with local actors and being receptive to their ideas, the MenAfriVac™ campaign, as a whole, will be significantly strengthened (Obregón and Waisboard, 2010: 25).

CONCLUSION

The MenAfriVac™ vaccine has the potential to save hundreds of thousands of lives. As the campaign expands throughout Sub-Saharan Africa, it is important to consider strategies that will bring the vaccine to difficult-to-reach populations and increase the likelihood of successfully vaccinating up to 95 percent of the at-risk population. The provision of small incentives to each person upon vaccination will allow for greater coverage rates, and could also be used to address other health or nutrition issues. Providing access to transportation and web networks as part of a broader strategy to improve tracking and reporting will ensure that individuals who are difficult to reach are vaccinated. Finally, community

3 It is important to consider task modifications when using local volunteers, since there may be a high rate of illiteracy among the group. In such circumstances, instructions should be adapted accordingly (Aylward and Linkins, 2005: 269).

participation and social mobilization are vital for creating awareness and mobilizing volunteers, without whom the mass vaccinations would be impossible. By employing these strategies and adapting them to local conditions, the MenAfriVac™ campaign will have the greatest chance of eliminating MenA epidemics in Sub-Saharan Africa.

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ABOUT THE AUTHORS

Samantha Grills is a student in the University of Waterloo M.A. in global governance program based at the BSIA, with a B.A. (Honours) in political science from Brandon University. She specializes in issues of human rights and poverty, with a particular focus on the use of microfinance to alleviate poverty and reduce gender inequities.

Sarah Cruickshank graduated with distinction from Wilfrid Laurier University in 2011 with a B.A. in global studies. She has recently completed the Wilfrid Laurier University master's in international public policy program at the BSIA and hopes to pursue a career in global health policy.

AUTHORS' NOTE

This policy brief is based on Samantha Grills' unpublished paper "Fighting Meningitis in Africa: The Implications of a New Vaccine" (2012) and Sarah Cruickshank's unpublished paper "Lessons for the MenAfriVac™ Campaign: Looking Back at the Eradication of Smallpox and the Global Polio Eradication Initiative" (2012).

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Le CIGI a été fondé en 2001 par Jim Balsillie, qui était alors co-chef de la direction de Research In Motion. Il collabore avec de nombreux partenaires stratégiques et exprime sa reconnaissance du soutien reçu de ceux-ci, notamment de l'appui reçu du gouvernement du Canada et de celui du gouvernement de l'Ontario.

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