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Editorial

The measles campaign in West and Central Africa: Remembering the future

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ABSTRACT

The rainy season was once the harbinger of measles and child deaths in Western Africa, but measles has now become so uncommon that some younger West African doctors have never seen a single case. A series of successful measles campaigns were carried out in the late eighties through the early part of this century in West Africa—these campaigns have almost eliminated measles in Mali, the thirtieth poorest country in the world. This article provides a retelling of the measles campaigns that were carried out in West Africa during that time period for young doctors and vaccine researchers. The power of vaccination to stop an endemic disease from killing between 5 and 20% of children under the age of five living in rural villages in West and Central Africa is recalled, and the importance of vaccination for the improvement of human life is considered deserving of renewed emphasis.

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1. Introduction

The words Mali and Timbuktu invoke images of dryness, sand, and desert. In truth, the contrast between those readily available images and the reality of the "hivernage" in West Africa could not be more dramatic. For an outsider, the experience of the rainy season can only be compared to having the Niger pour down from the sky; the roads turn to mud, the fields become puddles, and even sheet metal roofs do not manage to keep huts dry. For those of us who worked on the measles campaigns in West and Central Africa, that kind of rain brings back memories of measles epidemics and the deaths that followed close behind. But some younger West African doctors have no such memories. Those young doctors – even pediatricians – have never seen a single measles case.

AIDS is as devastating now as measles was then. And so, in this period between the ending of one pandemic and the next, it is important to remember the measles vaccination campaigns. Let us remember the triumph of vaccines over disease, even as yet another HIV vaccine trial has failed [1], and concerns are raised about the safety of new and old vaccines in the context of the expansion of the epidemic of HIV in the developing world. This article recalls the experience of vaccinating against measles in rural Africa, and suggests we remember the lessons we learned during those campaigns. We should remember those lessons on that day in the future, when we are setting out to remote villages in West Africa, holding an AIDS vaccine in our hands.

2. Sticks and insects

What young doctors in Africa do not remember, or have now forgotten, is the endless toll of child deaths from measles and malnutrition that accelerated as the rains came down. Then, as now, no food could be planted because of the rain, and families survived on crops that had been stored. By the end of the rains, there was often nothing but sticks and insects for children to eat. Children in the villages would begin to get thin, and then they would get a cough, a runny nose, and the skin rash of measles would follow soon after.

At the time, according to custom in some areas of West Africa, the treatment for children who were ill with measles was not to give them any meat – and not to bathe them either – and so with malnutrition and poor hygiene their measles would become more severe. Due to the effect of the measles virus on mucosal surfaces, the children would develop ulcerations in their mouths, diarrhea, and pneumonia. They would cease to eat entirely, becoming mere ghosts, unable to move and unable to eat, and then they would die.

Children died by the droves—every day during the peak of the measles season, villages would lose more children. During an epidemic, as many as one in three children between the ages of 1 and 5 living in rural villages in Africa would die. The morbidity and mortality was experienced at a personal level by the parents of the children, and by the medical students and physicians working in rural settings (SIB) and mission hospitals (ADG). For a frame of reference, in just 1 year, the World Health Organization (WHO) estimated that measles accounted for 452,000 deaths in Africa (58% of global deaths) [2]. Following the measles vaccine campaigns, this changed so dramatically that villagers and physicians still remember the change.

3. The vaccination campaigns

The first large measles control effort in Africa was the 20-country program that began in 1966 [3]. This effort eliminated measles in

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Table 1
Number of reported measles cases, by country group and year of nationwide catch-up supplementary immunization activities (SIAs)—World Health Organization African Region, 1999 and 2005 (reproduced with permission from MMWR)

Country	Year of catch-up SIAs	Population aged <15 years (in millions)	No. of reported measles cases		
				2005	
			1999[a]	Clinical[b]	Continued[c]
Group A[d]					
Botswana	1997, 1998	0.7	439	565	21
Lesotho	1999, 2000	0.7	944	218	1
Malwi	1998	6.1	152	182	24
Namibia	1997	o.8	296	235	2
South Africa	1996, 1997	15.5	385	1,944	609
Swaziland	1997, 1998	0.4	0	79	0
Zimbabwe	1998	5.2	772	403	11
Group A subtotal	–	29.4	2,988	3,626	667
Group B[e]					
Angola	2003	7.4	350	397	200
Benin	2001, 2002	3.7	2,573	207	165
Burkina Faso	2003	6.2	5,516	429	231
Burundi	2003	3.4	2,928	79	0
Cameroon	2003	6.7	10,894	1,299	581
Eritrea	2003	2.0	320	1,359	32
Ethiopia	2003, 2004	34.5	5,329	159	321
Gabon	2004	0.6	NA[f]	0[g]	0[g]
Gambia	2003	0.6	856	18	0
Ghana	2001, 2002	8.6	15,987	350	27
Guinea	2003	4.1	18,004	95	1
Kenya	2002	14.7	8,601	1,051	97
Liberia	2003	1.5	1,679	8[g]	8[g]
Madagascar	2004	8.2	35,156	NA	NA
Mali	2001	6.5	2,506	90	24
Mauritania	2004	1.3	5,263	127[g]	127[g]
Niger	2004	6.8	36,156	2,183[h]	2,183[h]
Republic of the Congo	2004	1.9	313	125	0
Rwanda	2003	3.9	4,359	259	96
Senegal	2003	5.0	3,666	129	0
Sierra Leone	2003	2.4	NA	29[g]	29[g]
Tanzania	2001, 2002	16.3	5,887	713	23[i]
Togo	2001	2.7	2,540	122	28
Uganda	2003	14.5	42,737	926	6
Zambia	2003	5.3	23,518	494	28
Group B subtotal	–	168.8	199,934	10,656	4,176
Total			202,972	14,284	4,845[a]

Sources: United Nations, World population prospects the 2004 revision, New York, NY; United Nations, 2005, and World Health Organization, Regional Office for Africa.

[a] Data are from aggregate reporting.
[b] Numbers of clinically suspected cases reported through the case-based system.
[c] Numbers of cases confirmed by epidemiologic linkage or laboratory testing.
[d] Countries that adopted the goal of eliminating measles and conducted SIAs during 1996–2000.
[e] Countries that conducted SIAs during 2001–2004.
[f] Not available.
[g] Case numbers from aggregate reports (no data reported through the case-based system).
[h] Case-based surveillance was not operational in Niger in 2005.
[i] Case numbers from aggregate reports were used because blood samples were taken from only 73% of suspected cases.

The Gambia, but measles quickly returned in other regions. A second large campaign was carried out as an integral component of the Expanded Program on Vaccination (EPI) in the late 1970s and early 1980s by WHO, and subsequent vaccination campaigns have taken place at relatively regular intervals, so as to give every African child at least one chance to be immunized.

Prior to the second measles campaign, information on the coverage of vaccination in rural areas of sub-Saharan Africa was lacking. Measles epidemics occurred cyclically with annual peaks immediately following the rainy season, killing 3–5% of children of all ages and as many as one in three children younger than 5 years of age. Estimates that only 10–37% of children were vaccinated have been published [4,5]. Interest in a second campaign in Mali and other West and Central African countries developed because earlier measles campaigns had a dramatic effect on child mortality from measles, reducing deaths by as much as 90% during the first year of the campaign [2].

Although the WHO and EPI coordinated the campaigns, each of the countries directed its own initiatives. Mobile teams, based in rural hospitals, were used because they had been found to be more cost-effective methods for mass vaccination. Centers for the campaign were set up in small towns at the “hospital of reference” (CSRef, in Mali), where refrigeration was available for the live vaccines used during the campaign. During the campaigns, vehicles with four or five workers – usually medical students, perhaps one doctor, but more often a medical technician that had been trained for this purpose – would go out to the surrounding villages, visiting several different villages during the course of a day.

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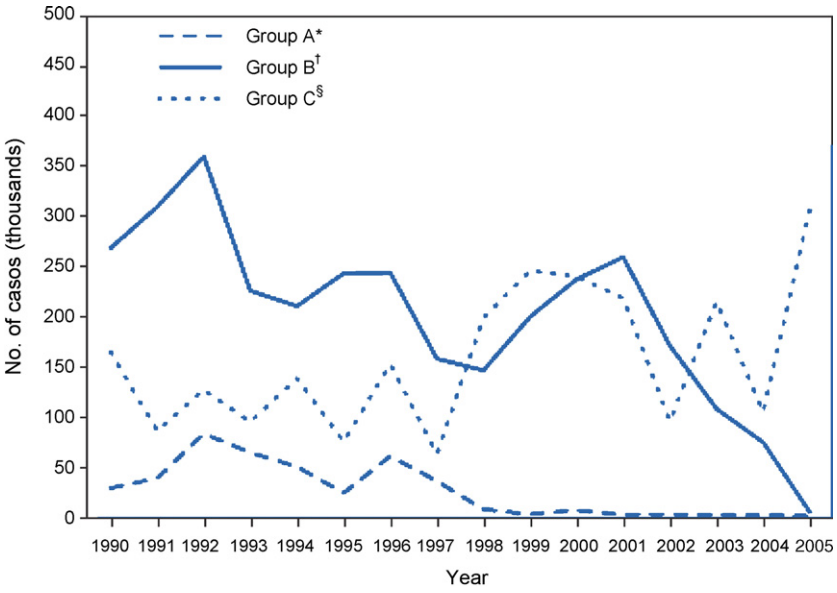


Fig. 1. Number of reported measles cases, by country group and year—World Health Organization African Region, 1990–2005. *Source*: World Health Organization. Regional Office for Africa. *Includes Botswana, Lesotho, Malawi, Namibia, South Africa, Swaziland, and Zimbabwe; initial supplementary immunization activities (SIAs) were conducted during 1996–2000. †Includes Angola, Benin, Burkina Faso, Burundi, Cameroon, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Liberia, Madagascar, Mali, Mauritania, Niger, Republic of the Congo, Rwanda, Senegal, Sierra Leone, Togo, Uganda, United Republic of Tanzania, and Zambia; initial SIAs were conducted during 2001–2004. §Includes Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Guinea-Bissau, Mozambique, and Nigeria; countries did not begin catch-up SIAs before March 2005 (except for SIAs in the Democratic Republic of the Gongo conducted in 2002 and 2004, which collectively targeted approximately half of the country's population aged <15 years). (Reproduced with permission from MMWR)

4. The village scene

The vaccination workers would travel in small trucks (usually four-wheel drive Toyotas) equipped with refrigerated crates containing the life-saving vaccines (measles, polio, Diphtheria and pertussis) and needles or jet-guns for the mass vaccinations in rural villages.[1] Once they arrived in the village, their approach was usually to begin (as is the custom throughout Africa) with a visit to the village decision maker, who was usually the village chief. An important strategy that was often used to increase acceptance of the vaccination was to remind older members of the community about the benefits of smallpox vaccination, because they could easily recall the effect of vaccination on a disfiguring disease. In general, the vaccination workers were welcomed, and often they were fed lunch.

Once given permission, the campaign workers would use loudspeakers to gather the villagers and provide information in an open session about vaccination, health and nutrition, to the gathered villagers, mainly mothers and children. They explained vaccination using concepts that were well known to the villagers such as: "better to prevent than cure" (mieux vaut prevenir que guerir); meaning that it was better to stop the illness than have to take care of a sick child. They would spend about 30 min explaining the advantages of vaccination and teaching the mothers about the vaccination record (a simple tri-fold health card they were to keep in their homes) during this session. There was always an opportunity to ask questions, and these sessions were sometimes quite dynamic—the verbal interchange between village outsiders and villagers was an important ingredient in the establishment of trust.

Then the teams would prepare the stage for the campaign, setting up tables and chairs outside under the trees if the weather permitted or else in a home or inside a school building in case of rain. One team would register the patients, weigh the babies and provide the mothers with a vaccination card. The other team would administer the vaccines—there were usually five vaccines administered during some of the campaigns (BCG, Diphtheria/tetanus, pertussis, oral polio vaccine and measles). As the vaccinations began, so too did the protestations of the children. The sound level crescendoed during the course of the morning, as each crying child added his or her voice to the chorus of children that had already received their vaccines.

When needed, medical care was provided directly on site, and occasionally the trucks would ferry sick children and adults back to the central hospital. For those too ill to travel, the vaccination teams carried some rudimentary treatment. Sick children were given penicillin by injection, and their mothers were taught how to give oral hydration. But there was really no easy treatment for the toxic combination of measles and malnutrition; not then, and not now.

5. Visual and auditory memories

We each have our memories of these vaccination campaign experiences—they are indelible. We remember the crowds in the villages, the many small children (some already carrying the stigmata of measles—fever with runny nose, red eyes, cough, rash and kwashiorkor), the smell of sweat as bodies were squeezed close together in the temporary clinics, the sound of children crying, and the sound of their mothers laughing and calling out to each other as they carried the crying children away. We also remember bringing the sickest children back to the referral hospital in the vaccination transport vehicle – crying, terrified, and – if not crying, then deathly ill. It was not uncommon to transport a child who was so ill she could not swallow (because of the blisters in her mouth) and who could not bend her legs because she had been immobile so long. Those children were usually silent during the ride to the hospital,

[1] The authors of this article wrote this description based on their memories of the campaigns that they each participated in. SIB was a physician working in the hospital of Koutiala, in the third region of Mali (Sikasso) on the border with Burkina Faso. ADG was a medical student working in Kananga, Kasai, otherwise known as the diamond province of Zaire. FB was coordinating the national laboratory network of public health in Bamako.

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and often, they were no longer alive by the time the Toyotas pulled into the hospital.

6. Results of the campaign

During the second measles vaccine campaign, in real terms, vaccination coverage was between 95 and 99%. The effect was dramatic. The number of reported measles cases in Subsaharan decreased by 93%, from 202,972 in 1999 to 14,284 in 2005 (Table 1, Fig. 1) [6].

While these figures give a digital window on the impact of the measles vaccination campaign in West Africa during the 1980s and late 1990s, the human impact was felt in the CsRef, in the villages, and by the fathers and mothers of the children. One year they were burying a child a day in the measles season, up to a dozen a week. There was no treatment. Local remedies did not work. But within just 1 year of the measles campaign, children did not die anymore. The measles campaign, with its loudspeakers and white-jacketed nurses and medical students, convinced villagers beyond the reach of radio and television that "modern" medicine worked. From one year to the next, the dying stopped, and the children lived.

The medical students (now doctors) and health care providers who participated in the campaign also have memories- of deaths and of the absence of death. When we speak about it, our words call up images of some of the children that died from measles during the campaigns. We each have our memories of small children, dying in different countries at different times, from a disease that no longer exists because we have a vaccine that made it go away.

Of course, no intervention is perfect. Some of the obstacles to successful measles campaigns reported in the literature at the time included inefficient vaccination (reasons unknown but poor cold chain suspected), residual cases of measles in children that had not been vaccinated in urban centers, long distances required to reach rural populations, and chronic underdevelopment of the health care infrastructure [7–9]. Measles surveillance was so poor in some regions that less than 10% of expected cases were reported [5]. Conditions have not improved dramatically over the years, but vaccination campaigns are still carried out. The use of routine vaccination has lead to a important decrease in measles incidence, depending on the vaccination coverage achieved in the different countries. On the other hand the most dramatic decrease in measles incidence has only been observed after the catch-up and follow-up campaigns targeting broader age groups in the different countries. One indication that measles vaccination is widely accepted as a safe and effective is that families were reported to have had their children vaccinated more than once during the December 2007 mass vaccination campaign in Bamako, Mali, so as to obtain more than their share of the other benefits of the campaign—free mosquito nets.

7. Conclusion

What is most remarkable about our collective memories of child deaths from measles in Africa is that our younger colleagues in West and Central Africa have no such memories. Young doctors working in many referral hospitals in Africa have never seen a child die from measles. And because they did not see the children die in such large numbers, and then miraculously not die the next year, they do not have any experience of the power of vaccination. That experience was transformational. We who have experienced it must speak about it. We must teach about it. And we must remember these experiences as we look to the future, and imagine a world without malaria, tuberculosis, and HIV.

There are more rural village campaigns to come. Even though we cannot imagine a world without AIDS, we must believe that one day, an HIV vaccine will come. We need to remember, and teach our younger colleagues, that nothing is as effective as vaccination, especially in rural villages in Africa, where developed world medicine has not yet extended its reach. A vaccine is the only hope for HIV and for the children being born with HIV, who are now dying, as they were once with measles, in droves.

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This article was written following conversations about HIV vaccine development and the experience of the measles campaign with Sory Ibrahima Bamba.

Sory Ibrahima Bamba who is Director of the Program for Health Interventions at the Direction Nationale de la Santé, Bamako, Mali.

Dr. Flabou Bougoudogo is the Director of the National Institute for Research in Public Health, Bamako Mali. All three worked on measles campaigns during the periods discussed in the article, and look forward to getting back into Toyotas when an effective AIDS vaccine is in hand.

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