Tropical Medicine and International Health doi:10.1111/j.1365-3156.2007.01862.x

VOLUME 12 NO 7 PP 815–822 JULY 2007

Sustained high coverage of insecticide-treated bednets through combined Catch-up and Keep-up strategies

Mark Grabowsky[1], Theresa Nobiya[2] and Joel Selanikio[3]

1 *American Red Cross, USA*
2 *Ghana Red Cross Society, Ghana*
3 *Datadyne Group, USA*

Summary

BACKGROUND Mass, free distribution (Catch-up) of insecticide-treated bednets (ITNs) during measles vaccination campaigns achieves immediate, high and equitable coverage for both ITNs and measles vaccine. Maintaining high coverage over time requires long-term, routine access to new nets (Keep-up). In many settings, only one approach – either campaign or routine delivery – has been available and have been seen as competing methods. Relying only on campaigns achieves high coverage at the cost of lack of later access. Relying solely on routine coverage builds a delivery infrastructure but may lead to slower rates of coverage and inequities. A combined Catch-up/Keep-up approach has been a common feature of vaccination programs for many years. We assessed the 3-year effects of a one-time Catch-up campaign followed by clinic-based social marketing for routine Keep-up on ITN coverage and use.

METHODS In December 2002, ITNs were distributed to all children attending a measles vaccination campaign in a rural district of Ghana. In the 3 years following that campaign, the district began offering ITNs at a subsidized price to pregnant women attending ante-natal clinics. This Keep-up scheme did not become fully operational until 2 years after the campaign. A coverage survey was conducted 38-month post-campaign using a standard two-stage cluster sampling method.

RESULTS Coverage of nets was high due to the combined contributions of both Catch-up and Keep-up. There were 475 households in the survey with at least one child less than 5 years of age. Among these households, coverage was 95.6% with any net, 83.8% with a campaign net, and 73.9% with an ITN. Of all children, 95.7% slept in a household that had a net, 86.1% slept in a household that had a campaign net. Not all available nets were used as only 59.6% of children slept under an ITN. The source of the nets was 77.7% from the campaign and 20% from routine clinics. Compared to households that participated in the campaign, households with children born after the campaign had higher rates of net ownership (75.1% *vs.* 67.7%, $P = 0.04$). Equity was high as the ratio of coverage in the lowest wealth quintile to that in the highest was 0.95 for ITN ownership and 1.08 for ITN use. These coverage and use rates were similar to those previously reported 5-month post-campaign, suggesting no decrease over 3 years.

CONCLUSION A high level of ITN coverage and use was achieved and sustained by sequential community-based mass campaign Catch-up and clinic-based Keep-up distribution. The campaign nets covered virtually all extant households while clinic-based distribution provided nets for the new sleeping spaces created post-campaign. Because nets can be shared, and most children are born into families that already have a net, the number of new nets needed to sustain high coverage is substantially lower than the number of newborn children. A Catch-up/Keep-up strategy combining mass campaigns for children and clinic-based distribution to pregnant women is an efficient strategy for achieving and sustaining high net coverage. Assuring proper use of nets is a remaining challenge.

keywords integration, bednets, malaria, measles, campaigns

Background

Malaria kills more than 800 000African children annually, mostly among the poorest that do not have access to adequate prevention and treatment (Rowe *et al.* 2006). Clinical trails have shown that among children who slept under an insecticide-treated bednet (ITN), the incidence of severe malaria was reduced by 45% and mortality by 17%

(Lengeler 2004). However, use of bednets remains well-below the goal of 60% coverage across virtually all of the high-risk areas of Africa (Baume *et al.* 2005; World Health Organization United Nations Children's Fund 2005). In these same populations, measles vaccination campaigns commonly achieve >90% coverage (Otten *et al.* 2005). When ITN distribution has been linked to measles vaccination campaigns, both interventions achieve high and equitable coverage (Grabowsky *et al.* 2005b). Integrating ITN distribution into measles campaigns is endorsed by WHO and UNICEF as a means to achieve rapid scale-up of ITN coverage while also increasing measles campaign vaccination coverage rates (WHO/UNCEF Joint Statement 2004).

While the coverage achieved from campaigns is immediate and high, there is concern that it may not be sustained (WHO/RBM 2005). Specifically, there is a concern that children born after the campaign may not have access to ITNs or use them properly. For measles vaccination, high levels of coverage are sustained by combining wide age-group campaigns (Catch-up) with routine vaccination (Keep-up) (WHO/UNICEF 2005). A comparable strategy for scaling-up and sustaining ITN coverage would combine large-scale distribution of free ITNs (Catch-up) such as during vaccination campaigns, and routinely providing ITNs to pregnant-women and children through public health clinics or commercial outlets (Keep-up). In this report we evaluated the 3-year effect of a combined Catch-Up and Keep-up strategy on ITN coverage and use.

Methods

In December 2002, ITNs were distributed to each child attending a measles vaccination campaign in Lawra District, Upper West Region, Ghana. A survey conducted 5-month post-campaign showed that coverage among under fives increased from 4.4% to 94.1% and 60.2% of children slept under an ITN (Grabowsky *et al.* 2005a). In the 3 years following that campaign, Lawra district phased-in a national scheme for distributing ITNs at ante-natal clinics. Pregnant women attending the ante-natal clinics were offered the option of purchasing an ITN at the clinic at a subsidized price of approximately $2.00, equal to approximately 50% of the commercial price. They could also opt to receive the subsidy in the form of a voucher which entitled them to a discounted purchase of a net at a commercial provider. This scheme was dependent on the clinic nurses to offer the voucher to eligible women attending the clinic. There was no outreach to women who did not attend the clinic. This scheme did not become fully operational until 2005. In the period from the campaign through 2004, the primary source of new nets was the unsubsidized commercial market.

For this study, a population-based survey was conducted 38-month post-campaign on a single day, February 16th 2006, in Lawra District. Volunteers fluent in the local dialect and in English were recruited by the Ghana Red Cross, more than half of whom had participated in the post-campaign evaluation in June of 2003. The volunteers received training for 1.5 days, during which they were instructed in the content of the questionnaire and in the use of handheld computers for administration of the questionnaire.

As with that earlier evaluation, a standard two-stage cluster sampling methodology was used (Henderson and Sundaresan 1982). The primary sampling frame was defined from population records maintained at the District medical office. Population clusters (roughly corresponding to villages) were randomly selected with population proportional sampling. Thirty-four clusters were selected, and a volunteer familiar with each cluster was assigned to it. A physical location was selected in each cluster which was deemed to be the center of the population (usually the village center). A direction was randomly selected and the first house encountered walking in that direction became the first house eligible to be sampled. The next closest house was then sampled, continuing until a minimum of 10 households were sampled in each cluster.

A Wealth Index was calculated using a standard World Bank method (Filmer and Pritchett 1998a). Briefly, questions were asked regarding household (HH) assets and characteristics, such as ownership of a bicycle, type of roofing material, water source, toilet type, etc. These questions were combined during analysis into a single HH wealth index, according to the asset index and scoring system developed by the World Bank. Individuals received the wealth index value of the HH in which they resided, and both HHs and individuals were divided into five approximately equal quintiles according to their wealth index value. The Equity Index is defined as the ratio of the results, such as ITN coverage, in the highest quintile to the lowest quintile. A consequence of assigning equal numbers to each quintile is that the difference in asset score between quintiles was not equal as HHs tended to be distributed towards the lower scoring range. Thus, there is less of a difference in average asset score between the poorer quintiles (e.g. moving from quintile 5 to quintile 4) than there is between wealthier quintile (e.g. quintile 2 to quintile 1).

As indicated above, the volunteers collected all data on handheld computers, or personal digital assistants (PDAs). The units used for this activity were the Zire 31 model made by Palm, Inc., and supplied and programmed by the

DataDyne Group using the Pendragon Forms software package. Once the data were collected, the PDAs were connected to a single laptop computer using for 'synchronization' of the data into a single aggregate database. The data were then analysed using both Microsoft Excel 2004 for Mac and EpiInfo 2002.

For the purpose of analysis, ITNs were defined as either pre-treated, long-lasting nets or nets reported to have been treated with insecticide within the preceding 6 months. Children were considered to have slept under an ITN if the HH contained an ITN and the caretaker reported that the child had slept under that net the previous night. Households were defined as a group of related individuals who took their meals together. All HHs were eligible for inclusion in the survey, including HHs without children under the age of five, but the analysis focused primarily on those HHs with children under the age of five.

Approximately 5 months before the evaluation, a retreatment campaign was conducted by the Ministry of Health. Among the 446 HHs with nets at the time of the campaign, 340 (76.2%) retreated the net within the prior 6 months – and these nets were considered ITNs for the purpose of the analysis.

Results

The coverage of nets in the HHs was high due to contributions of both 'Catch-up' and 'Keep-up.' There were 475 HHs in the survey meeting the study criteria of having at least one child less than 5 years of age and 574 nets in these HHs. The HH coverage with any net was 95.6%, with a campaign net was 83.8% and with an ITN was 73.9%. There was a high rate of retention of the nets provided during the Catch-up campaign that occurred 3 years prior to the survey. Of all nets, 446 (77.7%) came from the campaign, 10 (1.7%) were obtained before the campaign, and 118 (20.6%) after the campaign. Following the campaign, most of the nets acquired were through routine Keep-up activities at ante-natal clinics. The sources of the post-campaign nets were ante-natal clinics (89, 75.4%), markets (23 19.5%), family or friends (3, 2.5%), and other sources (3, 2.5%). (Table 1) The number of nets increased each year following the campaign. In the first year post-campaign, nine nets (9/574, 1.6% of all nets) were obtained, 12 (2.1%) were obtained in the second year and 87 (15.2%) in the third year. While all nets during the Catch-up campaign were free, the caretaker reported paying for 103 (87.3%) of the Keep-up nets.

Table 1 Source of nets obtained at or since the campaign and whether the nets required payment by the family.

Source	Free	Paid	Total
Campaign	446	0	446
Clinic	12	77	89
Market	0	23	23
Family or friend	2	1	3
Other	2	1	3
Total	462 (81.9%)	102 (18.1%)	564 (100%)

Children had a high rate of access to nets but not all nets available were used. Of the 674 children in the study population, 95.7% slept in a HH that had a net, and 86.1% slept in a HH that had a campaign net. Among all children, 72.6% of children slept under a net and 59.6% slept under an ITN. (Figure 1) These findings are similar to those reported 5-month post-campaign, except for ITN coverage, which was lower because of incomplete insecticide-retreatment of campaign nets. If long-lasting ITNs had been distributed during the campaign, the ITN coverage rate would have been at least as high as the campaign net

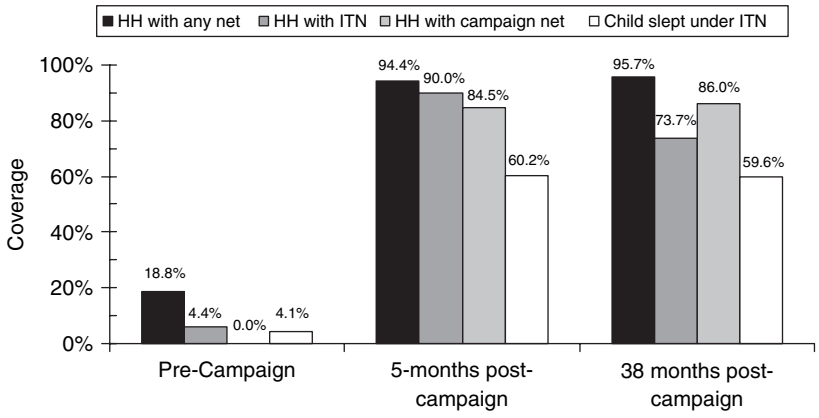

Figure 1 Coverage and use of nets, pre-campaign, 5-month post-campaign and 38-months post-campaign. Pre-campaign and 5-month post-campaign data from Grabowsky *et al.* 2005a is included for comparison.

coverage rate, that is, ≥86%, compared to 90% from the 5-month survey. There was an average of 1.4 children per HH, 1.2 nets per HH, 0.9 campaign nets per HH, 1.3 children per net and 1.4 children per campaign net.

The Catch-up/Keep-up strategy was able to provide coverage for children alive at the time of the campaign as well as for those born after the campaign. There were 229 children alive and eligible for a free ITN at the time of the campaign and 445 were born after the campaign. Compared to those alive at the time of the campaign, the children born after the campaign had higher rates of HH net ownership (75.1% *vs.* 67.7%, $P = 0.04$) and similar rates of ITN use (61.8% *vs.* 55.5%, $P = 0.11$).

Among all HHs, 21.1% (100/475) acquired a new net post-campaign. There were 445 children born after the campaign and 118 post-campaign nets, an average of 0.27 nets per newborn. This corresponds to a post-campaign coverage of newborns of 27% (equal to the 'keep-up rate'). During Catch-up, every child under five was targeted achieving a coverage of 94% (Table 1). This suggests that if a high rate of Catch-up is achieved, a substantially lower rate of post-campaign Keep-is needed to maintain high coverage. This is probably because the Catch-up nets are shared with younger and newborn siblings or redistributed from older top younger children.

We looked at the rate of bednet use among those who had access to shared Catch-up nets compared to those who relied only on acquiring Keep-up nets. This was done by looking at children who were born after the campaign according to whether they had an older sibling who was alive at the time of the campaign. Among the post-campaign children who had an older sibling who was alive at the time of the campaign, 60.2% (62/103) slept under an ITN while those post-campaign children who did not have an older sibling alive at the time of the campaign slept under an ITN 62.6% (214/342) of the time ($P = 0.66$). The former group was sharing Catch-up nets and the latter group was using Keep-up nets. This is a surprising finding and suggests both a high rate of sharing and that primagravida mothers were purchasing nets at a high rate for their first born children. It also suggests that net use had rapidly become a common practice and that families were taking advantage of whatever sources of nets were available.

We wanted to know whether families that paid for the net during Keep-up were more likely to use the net than those who received a free one during Catch-up. Among families that received a free net and had only one net, 76.1% (344/452) of children slept under the net compared to 70.3% (26/37) of children from families that paid for the net post-campaign and had only one such net (chi-square, $P = 0.63$). This suggests that paying for a net was not associated with a greater likelihood of using it. We also wanted to know whether the price of the Keep-up nets was a barrier to acquiring them. Of children in the poorest quintile, 18 (14.0%) had only Keep-up nets, while of the 79 children in the wealthiest quintile 3 (3.8%) had only Keep-up nets ($P = 0.01$). There may be other reasons which we did not assess why wealthier families did not acquire nets at the same high rate as poorer families. This might include the use of insect repellants or better built houses to reduce nuisance mosquito biting and thus the felt need for nets. However, it suggests that the Keep-up nets preferentially reached the poorest even when they had to pay for them.

The contribution of Keep-up nets acquired through the commercial sector was small compared to the public sector. Among all 674 children, there were 8 (1.2%) for whom the commercial net was the only ITN in their HH and 126 (18.7%) for whom the clinic net was the only net. Nets obtained through the commercial sector accounted for 4.9% (28/572) of all nets and were a small component of coverage and use. When nets acquired from commercial markets are excluded from the analysis, HH coverage had only a small decrease (95.6% *vs.* 93.3%) as did the rate of children sleeping under ITNs (59.6% *vs.* 58.9%). This suggests that in this setting the ANC clinics alone were able to meet the need for Keep-up nets.

Many children who did not receive Keep-up nets through ANC clinics attended other public health services. There were 29 children who slept in a house that did not have a net, of whom 24 were eligible to receive measles vaccination (i.e. 9 months of age or older). Among these eligible children, 79.3% (21/24) had received measles vaccination at a clinic and 95.8% (23/24) had a mother who attended ante-natal clinic during her most recent pregnancy. If these vaccinated children had received an ITN at the routine vaccination visit and used it, ITN use rates would have increased from 59.6% (402/674) to 62.8% (423/674). Similarly, if their mothers had received an ITN at prenatal clinic and they had slept under it, usage would have increased from 59.6% (402/674) to 63.1% (425/674). Expanding access to Keep-up nets to EPI clinics as well as ANC clinics might have improved coverage and use.

We also asked whether the Keep-up strategy was able to maintain the equity achieved through the free Catch-up campaign. The campaign had an equity index, the ratio of coverage in the lowest quintile to that in the highest quintile, of 1.01 for net ownership and 0.92 for net use (Figure 2). Three years post-campaign, the equity index was 0.95 for ITN ownership and 1.08 for ITN use. Thus, the transition from Catch-up to Keep-up maintained high equity.

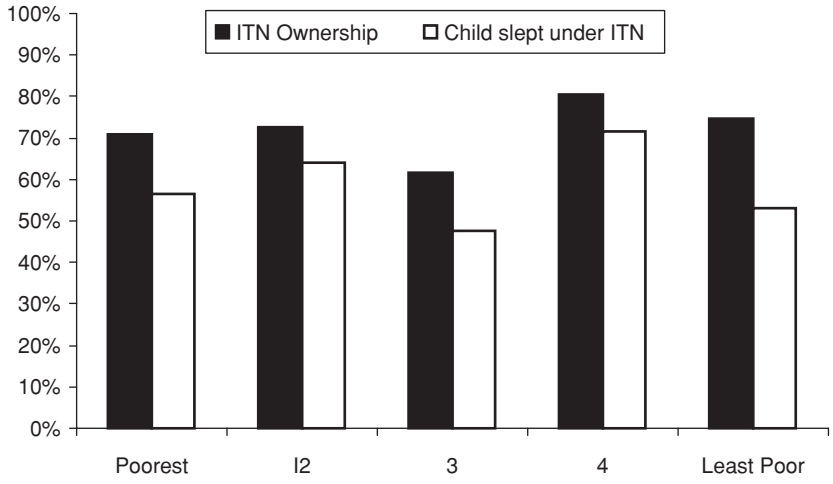

Figure 2 Equity of net ownership and use. The equity index, the ratio of coverage in the lowest quintile to that in the highest, was 0.95 for ITN ownership and 1.08 for ITN use.

Discussion

This is the first report of a combined Catch-up/Keep-up approach to achieve and sustain high bednet coverage. Such a strategy has been proposed as a method for utilizing all available methods but the impact and interactions of the elements was unknown (WHO/RBM 2005). Ina previous report we demonstrated that distributing free ITNs through a measles vaccination campaign can achieve high and equitable coverage for both ITNs and measles vaccination when measured at 5-month post-campaign (Grabowsky *et al.* 2005). This report extends those findings to 38-month post-campaign, showing the combined impact of Catch-up and Keep-up on sustaining high ITN coverage and use. A mass distribution campaign combined with post-campaign distribution through public-sector channels, such as through antenatal clinics, can achieve and sustain coverage that meets the Abuja targets of 60% for 3 years.

In this population, children born since the campaign had ITN coverage higher than those who were alive at the time of the campaign. This high coverage amongst those children born after the campaign is a surprising and encouraging finding. The number of ITNs obtained post-campaign was equal to only 20% of the number of newborns. It suggests that the campaign nets were shared or redistributed from older children to younger ones. That is, the net is hung over a sleeping space and all subsequently born children share that space and that net. With high campaign coverage, only first-born children – equal to about 20% of all births – would require a new net. It is also consistent with altruism – nets may have been redistributed to younger children based on need. As the youngest children are at the highest risk of death, post-campaign redistribution to younger children amplifies the public health impact of the nets.

The initial mass distribution campaign achieved a high degree of equity. Post-campaign distribution continued through ante-natal clinics which preferentially targeted the poorest. In this study, subsidized post-campaign nets contributed to higher coverage and greater equity. In contrast to other reports, use of nets was not higher among those who paid for them compared to those who received free nets (see NetMark research poster at http://www.netmarkafrica.org/research/quantitative/2004%20HH%20Surveys/net%20ownershipvsuse.pdf). We note that a retreatment campaign that occurred 6 months prior to the survey had a major impact on the number of nets that could be classified as ITNs. Had we used LLINs initially, the retreatment campaign would not have been necessary, and we believe this analysis is applicable to settings where LLINs are used.

One of the goals of introducing ITNs into a population is to create a 'net culture' of self-sustaining demand and proper use (Population Services International 2004). That goal was achieved in this study population. Net use was rapidly adopted post-campaign and as families acquired new nets these were used at similarly high rates. There were no ongoing, specific community-wide efforts aimed at increasing net use. Information or encouragement for net use would have been through interaction with ante-natal clinic staff or at the time of receiving a net or voucher or with commercial vendors. However, those that received nets during the campaign would not have had such interactions. The observed high use rates suggest that there were other mechanisms creating and sustaining net use. One possibility is that the presence of the nets themselves – possibly combined with the clinic staff interactions – induced

higher rates of use and demand. This is consistent with theories of social diffusion of knowledge and adoption of new innovation (Rogers 1983). According to these theories, adoption of this new technology may have been accelerated and sustained by the presence of ITNs in essentially all HHs and ongoing contact with early adopters in the community and expert opinion. However, understanding the mechanisms that create long-term use requires additional investigation.

A key difference in the use of vaccines and ITNs is that vaccination is required separately for each child while one ITN is required per bed regardless of the number of children sharing the bed. Children cannot share vaccinations but young African children typically share beds and bednets. Therefore, fewer ITNs than vaccinations are required per newborn to maintain similar levels of post-campaign coverage. The rate of new post-campaign ITNs required to sustain high coverage depends on how children are distributed among sleeping spaces and the rate of creation of new sleeping spaces. We assume that first births lead to the creation of a new sleeping space in the HH and all subsequent children share the same bed. This is reasonable for the 3 years time period of this study but becomes less likely over a longer time period as more children are born. In the area of Ghana where this study took place, there was an average of 5.1 surviving infants per woman (Ghana Statistical Service, MEASURE IRD, Ngouchi Memorial Institute 2004; Johnson *et al.* 2005). In order for every post-campaign first born (and every new sleeping space) to get a new net, the post-campaign coverage (the 'keep-up rate') must be equal to 1/5.1 or approximately 20%. Thus, coverage will be maintained if all newborns, or 20% of all births, receive a new net. In this population, there were 445 children born after the campaign and 118 post-campaign nets, an average of 0.27 nets per newborn. We observed that this keep-up rate of 27% was adequate to support a HH coverage rate of 95.6%. Previous estimates of the number of nets needed were based on the assumption that every newborn would require a new net (Lee and Guimier 2004). Our findings suggest that the need for new nets post-campaign is substantially lower than these previous estimates. More accurate estimates of total net needs will require a better understanding of how long nets last in the field and what local practices influence net wear and tear. This study was done 3-year post-campaign and it is likely that the campaign nets are approaching the end of their usable life. The need, method and timing of replacing the Catch-up nets needs to be evaluated.

Even higher coverage could have been achieved through more efficient use of the ANC or child-health clinics. Among those who did not have net in the home 3-year post-campaign, 95.8% of their mothers attended ANC clinics and 79.3% of the children received routine measles vaccination at clinics. When a child attends a clinic and could have received a vaccination but does not, it is considered a 'missed opportunity.' Analysis of missed opportunities for immunization can provide important insights into clinic operations and inefficiencies (Hutchins et al. 1993). Had there been no missed opportunities for ITNs at ante-natal clinics or measles-vaccination visits, the coverage would have increased by 3.2 percentage points. This is greater than the contribution of commercial nets in this population (2.4%). While all delivery methods can contribute to overall coverage, making better use of existing contacts at public clinics may be a more useful strategy than developing new private sector delivery channels.

Measles vaccination campaigns are scheduled every three to 4 years in virtually every country in sub-Saharan Africa. It is expected that these measles campaigns will deliver vaccines to approximately 40 million children annually. Each of these interactions may be an opportunity for ITN delivery. Successful integration of ITNs into such campaigns requires a specific effort at coordination between the national immunization and malaria programs as well as with other partners. High coverage of Catch-up nets will provide a foundation for effective Keep-up distribution through routine channels, such as ANC clinics. With these integrated approaches, public-sector delivery of bednets in Africa can achieve the same high and sustained coverage levels as are achieved in vaccination programs.

Acknowledgements

The authors thank ExxonMobil for financial support, the American Red Cross and the International Federation of Red Cross and Red Crescent Societies for administrative support, and the volunteers and staff of the Ghana Red Cross Society for their tireless efforts during ITN distribution and this assessment. ExxonMobil had no role in the study design; in the collection, analysis, and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

References

Baume CA, Marin CM, Shafritz L, Alilio M, Somashekhar S & Payes R (2005) Awareness, Ownership, and Use of Mosquito Nets in Nigeria, Senegal, Zambia, Ghana, and Ethiopia. *Academy for Educational Development* http://www.netmarkafrica.org/research/quantitative/2004%20HH%20Surveys/Cross%20National%20Summary%2011-7-05.pdf.

Filmer D & Pritchett L (1998a) *Estimating Wealth Effects Without Expenditure Data – or Tears: An Application to Educational Enrolments in States of India*. World Bank Policy Research Working Paper No. 1994, Washington.

Ghana Statistical Service, MEASURE IRD, Ngouchi Memorial Institute (2004) *Ghana Demographic and Health Survey 20*. Accra, Ghana.

Grabowsky M, Nobiya T, Ahun M *et al.* (2005a) Distributing insecticide-treated bednets during measles vaccination: a low-cost means of achieving high and equitable coverage. *Bulletin of the World Health Organization*. **83**, 195–201.

Grabowsky M, Farrell N, Hawley W *et al.* (2005b)*Ghana & Zambia: Achieving Equity in the Distribution of Insecticide-Treated Bednets Through Links with Measles Vaccination Campaigns*. World Bank. HNP Discussion Paper – Reaching the Poor #10. February 2005.

Henderson RH & Sundaresan T (1982) Cluster sampling to assess immunization coverage: a review of experience with a simplified sampling method. *Bulletin of the World Health Organization* **60**, 253–260.

Hutchins SS, Jansen HA, Robertson SE, Evans P & Kim-Farley RJ (1993) Studies of missed opportunities for immunization in developing and industrialized countries. *Bulletin of the World Health Organization* **71**, 549–560.

Johnson K, Shea R & Pav G (2005) *The Stall in Mortality Decline in Ghana: Further Analysis of Demographic and Health Surveys Data*. ORC Macro, Calverton, Maryland, USA.

Lengeler C (2004) Insecticide-treated bed nets and curtains for preventing malaria. *Cochrane Database of Systematic Reviews* **2**, CD000363.

Otten M, Kezaala R, Fall A *et al.* (2005) Public-health impact of accelerated measles control in the WHO African Region 2000–03. *Lancet* **366**:832–839.

Population Services International (2004) *Building a Net Culture in Kenya: PSI Uses 'Targeted Subsidy' To Maximize Malaria Health Impact*. http://www.psi.org/resources/pubs/kenya-.ITN.pdf (Accessed April 24 2006).

Rogers EM (1983) *Diffusion of Innovations*. 4th edn. Simon and Schuster, New York.

Rowe AK, Rowe SY, Snow RW *et al.* (2006) The burden of malaria mortality among African children in the year 2000. *International Journal of Epidemiology* **35**, 691–704, Review.

WHO/RBM (2005) *Working Group for Scaling-up Insecticide Treated Nets. Scaling Up Insecticide-Treated Netting Programs in Africa: A Strategic Framework for National Action*. WHO/RBM, Geneva 2005.

WHO/UNCEF Joint Statement (2004) *Malaria Control and Immunization: A Sound Partnership with Great Potential*. WHO/HTM/RBM/2004.52 Rev 1.

Corresponding Author **Mark Grabowsky**, The Global Fund to Fight AIDS, Tuberculosis and Malaria, 8 chemin Blandonnet, 1214 Vernier (GE), Switzerland. Tel.: +41 22 791 5943; Fax: +41 22 791 1701; E-mail: mark.grabowsky@theglobalfund.org

Couverture étendue et durable de l'usage de moustiquaires traitées aux insecticides selon des stratégies combinées de rattrapage et de maintien

DONNÉES DE BASE La distribution de masse, gratuite (rattrapage) de moustiquaires traitées aux insecticides (MTI) durant les campagnes de vaccination contre la rougeole, permet la couverture immédiate, étendue et équitable à la fois pour les MTI et pour le vaccin contre la rougeole. Le maintien d'une couverture étendue au cours du temps nécessite l'accès continue et à long terme à de nouvelles moustiquaires (maintien). Nous avons investigué les effets de trois années de campagne de rattrapage suivie d'un marketing social basé sur la clinique, pour le maintien continue de la couverture et de l'usage des MTI.

MÉTHODES En décembre 2002, les MTI ont été distribués à tous les enfants participant à une campagne de vaccination contre la rougeole dans un district rural du Ghana. Au cours des trois années suivant la campagne, le district a commencé à offrir des MTI à un prix subventionné aux femmes enceintes visitant les cliniques prénatales. Ce schéma de maintient n'est seulement devenu totalement opérationnel que deux ans après la campagne. Une enquête sur la couverture a été menée pendant 38 mois après la campagne en utilisant une méthode standard d'échantillonnage à deux niveaux.

RÉSULTATS La couverture en moustiquaires était haut élevée grâce aux contributions combinées du rattrapage et du maintien. 475 ménages dans l'étude avait au moins un enfant de moins de cinq ans. Parmi ces ménages, la couverture était de 95,6% pour n'importe quel type de filet, 83,8% pour un filet obtenu via la campagne de promotion et 73,9% pour un MTI. De tous les enfants, 95,7% dormaient dans un ménage ayant un filet, 86,1% dormaient dans un ménage ayant un filet obtenu via la campagne. Tous les filets disponibles n'étaient pas utilisés car seuls 59,6% des enfants dormaient sous une MTI. La source des filets était dans 77,7% des cas, la campagne et dans 20% des cas, les cliniques habituelles. Comparé aux ménages qui ont participé à la campagne, les ménages avec des enfants nés après la campagne avaient des taux plus élevés de possession de filets (75,1% contre 67,7%; $P = 0{,}04$). L'équité était élevée car le rapport entre la couverture dans la quintile la moins riche et celle dans la quintile la plus riche était de 0,95 pour la possession de MTI et de 1,08 pour l'usage des MTI. Ces taux de couverture et d'usage étaient similaires à ceux précédemment rapporté dans une étude avec 5 mois de suivie post campagne et qui suggérait aucune diminution sur trois ans.

CONCLUSION Un niveau de couverte élevée et d'usage de MTI a été atteint et maintenu par une campagne séquentielle de masse basée sur la communauté par un rattrapage et un maintien de la distribution au niveau de la clinique. Les filets de la campagne de promotion ont couvert pratiquement tous les ménages existants alors que la distribution au niveau de la clinique fournissait des filets pour les nouveaux espaces de sommeil survenus après la campagne. Comme les filets peuvent être partagés et la plupart des enfants sont nés dans des familles ayant déjà un filet, le nombre de nouveaux filets requis pour maintenir la couverture étendue est substantiellement inférieur au nombre d'enfants nouveau-nés. La stratégie de rattrapage/maintien combinant des campagnes de masse pour les enfants et la distribution aux femmes enceintes au niveau des cliniques est une stratégie efficace pour atteindre et maintenir une couverture étendue en terme de filets. Assurer l'usage approprié des filets demeure un autre défi.

mots clés intégration, moustiquaires, malaria, rougeole, campagnes

Una cobertura alta y sostenida de redes mosquiteras impregnadas mediante estrategias de 'salto adelante' y 'mantenimiento'

ANTECEDENTES La distribución masiva y gratis (' estrategia de salto adelante' - *Catch-up*) de redes mosquiteras impregnadas (RMI) durante las campañas de vacunación de sarampión alcanza niveles de cobertura inmediatos, altos y equitativos para las RMI y la vacuna de sarampión. El mantener una cobertura a lo largo del tiempo requiere un acceso rutinario y a largo plazo a nuevas mosquiteras (estrategia de '*mantenimiento' – Keep Up*). Hemos evaluado el efecto a tres años de una campaña de '*salto adelante*', seguida por un marketing social basado en la clínica para el mantenimiento rutinario de la cobertura y uso de RMI.

MÉTODOS En diciembre del 2002, se distribuyeron RMI a todos los niños que acudían a la campaña de vacunación de sarampión en un distrito rural de Ghana. Tres años después de la campaña, el distrito empezó a ofrecer RMI subsidiadas a mujeres embarazadas que acudían a clínicas prenatales. Esta estrategia de *mantenimiento* no fue totalmente operativa hasta dos años después de la campaña. Se realizó una encuesta de cobertura 38 meses después de la campaña, utilizando un método estándar de muestreo por grupos en dos etapas.

RESULTADOS La cobertura de las redes mosquiteras era alta debido a la contribución combinada tanto de las estrategias de *'salto adelante'* y *'mantenimiento'*. Se incluyeron 475 hogares en el estudio, con al menos un niño menor de cinco años. Entre estos hogares, la cobertura era del 95.6% con cualquier red mosquitera, 83.8% con una red de campaña, y 73.9% con un RMI. De todos los niños, un 95.7% dormía en una casa que tenía una red, 86.1% dormía en una casa que tenía una red de campaña. No todas las redes disponibles eran usadas, pues solo un 59.6% de los niños dormían bajo un RMI. La fuente de las redes era un 77.7% de la campaña y un 20% de otras clínicas de rutina. Al compara con los hogares que participaron en la campaña, los hogares con niños nacidos después de la campaña tenían una mayor tasa de posesión de redes (75.1% vs 67.7%, $P = 0.04$). La equidad era mayor puesto que el ratio de la cobertura en los quintiles más pobres y en los más ricos fue de 0.95 para posesión de una red y 1.08 para su uso.Esta cobertura y ratio de uso fue similar a aquella previamente reportada 5 meses post campaña, sugiriendo que no hubo una disminución a lo largo de los tres años.

CONCLUSIÓN Se alcanzó un alto nivel de cobertura y uso de RMI utilizando una estrategia secuencial con una campaña de distribución masiva basada en la comunidad ('salto adelante') y una distribución a través de un centro de salud ('de mantenimiento'). Las redes de la campaña cubrían virtualmente todos los hogares existentes, mientras los entregados en la clínica cubrían nuevos espacios dormitorios creados después de la campaña. Debido a que las redes pueden compartirse, la mayoría de los niños nacen en familias que ya tienen una red, y el número de nuevas redes que se necesitan para sostener una cobertura alta es sustancialmente más bajo que el número de nuevos nacimientos. Una estrategia *salto adelante / mantenimiento* que combina campañas de distribución masiva para niños y distribución basada en centros de salud a mujeres embarazadas, es una estrategia eficiente para alcanzar y mantener una alta cobertura de RMI. El asegurar el uso apropiadas de las RMI continúa siendo un reto.

palabras clave integración, mosquiteras impregnadas, malaria, sarampión, campañas