

A conversation with Simon Cousens on June 2, 2014

Participants

- Simon Cousens – Professor of Epidemiology and Medical Statistics, London School of Hygiene & Tropical Medicine (LSHTM); Staff Member, Child Health Epidemiology Reference Group (CHERG)
- Jake Marcus – Research Analyst, GiveWell
- Sean Conley – Research Analyst, GiveWell

Note: This set of notes was compiled by GiveWell and gives an overview of the major points made by Professor Cousens.

Summary

GiveWell spoke with Professor Cousens about the midline survey results of Development Media International's cluster randomized controlled trial that is measuring the effects of its mass media health campaigns.

Overview of the Development Media International (DMI) cluster randomized controlled trial (RCT) in Burkina Faso

The research team that is leading the cluster randomized controlled trial (RCT) on the Development Media International (DMI) mass media health campaigns determined that Burkina Faso was the best country for the study. Media consumption in Burkina Faso is dominated by local radio stations, unlike in other countries, where national radio stations and television programs are more popular. This meant that the research team was able to divide Burkina Faso into 14 geographic clusters, each corresponding to a different local radio station, without people in one cluster hearing another cluster's radio messages. The radio program only aired in clusters participating in the study and the cost of the program was probably more than is typical, because it had to be translated into several different languages. DMI broadcasts its health campaigns in seven of the clusters, which form the intervention group. The other seven clusters form the control group and do not receive any intervention from DMI.

DMI's goal was to broadcast its messages to 40,000 people in each cluster, which it achieved. It does not know how many people listened to the radio programs in addition to this number.

The research team is doing a baseline survey, a midline survey, and an endline survey in Burkina Faso to measure the effect of DMI's program on health knowledge, behaviors, and child mortality. Child mortality is the primary outcome being measured in the RCT, but the research team also is measuring knowledge and behaviors to better understand the mechanism of the program's impact on child mortality.

Baseline survey

During the baseline survey, the research team administered a mortality survey and socioeconomic survey to all subjects in the RCT. The socioeconomic survey was based on questions from the Demographic and Health Surveys (DHS). The research team recorded the assets, such as latrines, owned by each individual and used this data to calculate a wealth index.

Midline survey

Mortality rates require a large sample size and are expensive to measure, so the midline survey focused on knowledge and behaviors, rather than mortality.

The interviewers for the midline survey were not employees of DMI. They were trained by the London School of Hygiene & Tropical Medicine (LSHTM) and Centre Muraz, LSHTM's local partner. The research team tried to avoid biasing interviewers. For example, it did not tell them which clusters were part of the intervention group and which were part of the control group. However, it was difficult to prevent the interviewers from learning this information, because some of the interview questions asked subjects about whether they had heard DMI's radio messages.

Among other questions, interviewers asked mothers whether their children had been ill in the previous two weeks. If the mother answered yes, the interviewer would ask what type of illness the child had experienced and how the mother had treated it. Questions about treatment were open-ended to avoid prompting mothers to answer in a particular way. The research team calculated the percentage of the women whose children had been ill in the previous two weeks who had used the treatments that DMI had promoted.

Endline survey

The research team will do a mortality survey at the end of the RCT in which it compares the average decrease in mortality rates in the control clusters to the average decrease in the intervention clusters.

Strengths of this RCT

- Unlike some evaluations for similar programs, the Burkina Faso RCT uses randomization with concurrent controls. Though the randomization was imperfect, it is better than most similar studies have achieved.
- The Burkina Faso RCT uses changes in child mortality rates as the primary metric of effectiveness. Many other studies of the effectiveness of media campaigns used knowledge and reported behavior as metrics of effectiveness, but there are concerns that reporting may be influenced by exposure to the intervention.

Analysis of the midline survey results

The research team analyzed the difference in difference in survey results between the clusters. It considered each cluster as a whole, rather than modeling individuals within clusters. According to the literature on cluster RCTs in medical research, analyses based on

cluster-level data are more robust than analyses based on individual-level data when the RCT has a small number of clusters. Some information is lost when survey data is organized into clusters, but the point estimate for each cluster reflects the totality of the data.

GiveWell asked whether doing a cluster-level analysis rather than an individual-level analysis would make it more likely for a small number of clusters to bias the overall results.

A cluster-level analysis would not be more likely than an individual-level analysis to have this problem. However, the relatively small sample size in the midline survey means that there may be some inaccuracy in the results due to external factors in one or two clusters biasing the data.

The research team used a *t*-distribution to calculate confidence intervals for the mean differences between clusters. A *t*-distribution assumes that the data is normally distributed but is robust to deviations from the assumption of normality, even with small sample sizes. The power calculations for the study were based on simulations.

Summary of the midline survey results

DMI's campaigns had a large effect on some behaviors but little or no effect on others. They were more effective in changing infrequent behaviors, such as treatment of diarrhea using oral rehydration therapy (ORT), than in changing daily habits. Professor Cousens suggested that this might be because a woman with an ill child has a clear incentive to try a new treatment, but people experience fewer obvious concrete benefits to changing daily habits.

For some treatments, the main barrier may be lack of knowledge, while for other behaviors, such as breastfeeding, there may be strong normative influences. For example, the local culture teaches women to provide infants with water during the hot season, rather than exclusive breastfeeding.

The relationship between the duration of a campaign and the magnitude of the resulting behavioral change is unclear. Professor Cousens does not know whether the remaining year of DMI's campaigns in Burkina Faso will be effective in changing daily habits.

Issues in interpreting the results of the RCT

Heterogeneity of results among clusters

Though on average the intervention group had a larger improvement in knowledge and behavior than the control group, there was considerable heterogeneity between clusters. This was partly due to the small sample size of the clusters: 350 women were surveyed in each cluster. The purpose of the RCT is to measure the overall effect of the intervention, rather than measuring the effect in each cluster.

Differences in baseline mortality rates between the control clusters and intervention clusters

The research team needed to restrict the RCT to 14 regions in Burkina Faso in which a sufficient percentage of the population listens to the local radio station. The relatively small

number of clusters caused challenges, because there were some initial differences between the clusters.

The baseline child mortality rate in each cluster ranged from 71 per 1000 to 183 per 1000 with some clusters in the treatment group with higher mortality rates than some clusters in the control group and vice versa. On average though, the control group had a lower baseline child mortality rate. The average child mortality rate was 136 per 1000 in the intervention group and 102 per 1000 in the control group. Professor Cousens believes that one reason for this is that the intervention clusters were on average farther from the capital of Burkina Faso. There is a correlation between the distance of a cluster from the capital and the mortality rate in a cluster, partly because clusters that are farther from the capital receive less investment.

It is unclear whether a higher baseline mortality would lead to a larger or smaller relative reduction in mortality. It may be that regions with high baseline mortality have more opportunity for improvement in mortality rates. On the other hand, it may be that regions with higher mortality rates are poorer, more remote, and have worse health services, which would make it more difficult to reduce mortality. Professor Cousens noted that across sub-Saharan African there is not a strong correlation between mortality level and rate of decline at a national level.

Potential reporting bias

There is a potential for bias in self-reporting behaviors. For example, subjects may say what they believe that the interviewer wants to hear. The research team cannot be certain that this did not occur. However, the fact that the midline survey did not demonstrate positive impacts on some behaviors suggests that there was not a strong tendency for subjects to overstate their behavioral changes.

Other factors contributing to declines in child mortality in Burkina Faso

According to DHS, there was a large decline in mortality in Burkina Faso between 2003 and 2010. The mortality rate in Burkina Faso has been declining faster than that of most other countries. This complicates the results of the RCT, because the study may have less power than planned to detect a reduction in mortality.

Some of the decline in mortality rates in Burkina Faso is due to large national health programs, which the research team documented in its analysis. For example, there was recently a large bed net distribution program. Nearly 100% of households interviewed in the midline survey had at least one bed net, which was a large increase from the baseline. There were also national immunization days during which polio vaccines and vitamin A supplements were administered. The research team is documenting smaller health programs in various clusters, but in general it does not believe that there is a major difference between the programs in the intervention clusters and the control clusters.

The research team is concerned about the impact of a large health worker training program funded by the Bill & Melinda Gates Foundation. The program is active in two clusters, one from the control group and one from the intervention group. The research team believes that the program is having a significant effect in the control cluster but is uncertain how this compares to its effect in the intervention cluster. The research team is reviewing the study's analysis plan with the study's advisory committee. If the research team decides that the training program is significantly affecting the results of its RCT, it may perform a sensitivity analysis in which it removes those two clusters from the data.

All GiveWell conversations are available at <http://www.givewell.org/conversations>