

Can mass media interventions reduce child mortality?



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Many people recognise that mass media is important in promoting public health but there have been few attempts to measure how important. An ongoing trial in Burkina Faso (ClinicalTrials.gov, NCT01517230) is an attempt to bring together the very different worlds of mass media and epidemiology: to measure rigorously, using a cluster-randomised design, how many lives mass media can save in a low-income country, and at what cost. Application of the Lives Saved Tool predicts that saturation-based media campaigns could reduce child mortality by 10–20%, at a cost per disability-adjusted life-year that is as low as any existing health intervention. In this Viewpoint we explain the scientific reasoning behind the trial, while stressing the importance of the media methodology used.

Child mortality and the case for a focus on demand

Logic suggests that however much money is spent on health services, they will only work effectively if people use those services and behave in life-protecting ways. UNICEF's "Facts for Life"¹ is based on this concept. Reflecting on the limited progress made towards reducing child mortality by two-thirds by 2015, the 2012 Countdown to 2015 report² suggested that, although supply-side investments have worked well in many countries, "Interventions...requiring behaviour change (early initiation of breastfeeding, care-seeking for pneumonia) appear stalled at coverage levels of 30–50%, suggesting that more effective ways are needed to reach women and children with these and similar interventions."²

But how can we persuade national governments to spend money on promoting demand, rather than on midwives or medicines, when none of us know how important demand is? The challenge here is to quantify the importance of human knowledge and motivation relative to other spending imperatives.

An epidemiological approach to mass media campaigns

Why is evidence for the importance of demand missing? Why do most of the data either fall short of the standards required to impress policy makers, or show negative results? The most comprehensive attempt to answer this question is provided by Bob Hornik,³ in *Public Health Communication, Evidence for Behaviour Change*. Hornik looks carefully at the evidence from controlled trials of health communications campaigns. The few major trials that have taken place "have shown either ambiguous or no evidence of effects"³ Hornik contrasts these with far "better" results from less rigorous research designs, with many reporting successful outcomes.^{4–11} The obvious interpretation is that "the better designed the evaluation of public health communication, the worse the evidence for important effects",³ and thus that "apparent effects in less well designed studies are artefactual, the result of inadequate research design".

However, Hornik argues instead that although the analyses were done with great skill and interpreted with great caution, the media interventions themselves—in every case—were inadequate.^{3,11} In the COMMIT

(smoking cessation) trial, for example, which used 11 pairs of matched communities in the USA, "the treatment communities received very little more exposure than the control communities"³ (15·2 on a 45 point scale in the treatment communities, compared with 14·9 in the control communities).¹² Hornik blames the randomised controlled trial design itself ("Extraordinarily, they are trying to control for the national media machine") which prevents the deployment of the most powerful—usually national—media channels. He concludes that, "despite the best intentions, these trials sometimes produced very good answers to an uninteresting question: if you don't do very much in the way of treatment, then can you have much effect?"

This conclusion is very important. It describes not only a methodological problem (the difficulty in designing any randomised controlled trial of media when national media is strong), but also a crucial implementation principle. Our own experience, based on 20 years of delivering mass media campaigns, is that substantial behaviour change is possible when campaigns are broadcast with sufficient intensity. All of the campaigns detailed in the appendix^{13–15} involved broadcasting at least six times per day on their given subjects and all showed shifts in behaviours. The most remarkable result is from Ethiopia,^{14–16} where hygiene promotion messages were broadcast up to 14 times per day for 3 years. This campaign was notable for great reductions in observed dirty hands, falling from 74% to 26% ($p < 0\cdot001$) and for a 20% reduction in trachoma prevalence, without the use of antibiotics. As described in this Viewpoint, many ingredients make up a successful campaign, but our experience indicates that saturation coverage is the most important.

Nevertheless, the methodological limitations of data detailed in the appendix are clear. First, every study relied on cross-sectional before-and-after comparisons, so other potentially confounding factors could have affected the results. (Two campaigns, Cambodia 2004¹⁷ and India 2009,¹⁸ were analysed for a dose-response effect, with people more exposed to the campaign exhibiting higher rates of the targeted behaviours than those less exposed, but this is not conclusive). Second, most evaluations relied on self-reported behaviours: people may know the "correct" answers after an

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See Online for appendix

intensive campaign without actually changing their behaviour. (In three of the above campaigns, behaviour was measured by independent observation, but this is not practical for many behaviours—eg, contraceptive use). It is plausible, on the basis of this and similar evidence,^{19–24} that media campaigns can change behaviour, but it is not proven.

To reduce the problem of confounding factors requires a randomised controlled trial. For the problem of self-reporting, one solution is to measure the effect on a hard health outcome, such as mortality, rather than knowledge or behaviour change (which are the norms for media campaign evaluations). Mortality data would also allow standardised economic calculations to evaluate the cost-effectiveness of media campaigns in terms of dollars per life saved.

Unfortunately, the effect of any single-issue campaign on all-cause mortality is modest and therefore hard to identify statistically. However, a comprehensive campaign targeting multiple life-saving behaviours for children could, if successful, yield detectable reductions in all-cause mortality.

The intervention: the Saturation+ method

Concluding his analysis of whether public health communication can change behaviours, Hornik³ asks whether the dominant literature^{6,20,23,24} has missed something important:

“Most of the innovative work in public health has focused on the problem of developing high quality messages reflecting particular evidence about the underpinnings of health behaviour. This has been a good thing. At the same time there has been less attention to the problem of exposure to those messages and how to make sure that a large part of the target audience is exposed to program messages, repeatedly... And that may be a crucial failing.”²³

If our trial is successful, it should not, therefore, be interpreted as evidence that any mass media campaign can reduce child mortality. We are testing a particular methodology, DMI’s Saturation+ approach, which is based on saturation, science, and stories.

The saturation component entails broadcasting messages 6–12 times per day on market-leading radio stations or at least three times per day on market-leading TV stations, using 60 s spots in local languages as the foundation of the campaign.

The science component entails first quantifying the geographic coverage and market share of media channels in different parts of the country and with different demographic groups; and second targeting behaviours that are predicted to save the most lives per dollar spent.

Finally, stories are used to build emotional identification between the audience and the characters as they advance through the early stages of the narrative (characterisation, their goals, the obstacles they face). It

is also important that the emotional climax of the story (the moment of decision, in which protagonists must either overcome the obstacles or revise their goals) addresses the crucial barrier to behaviour change, as identified by formative research. All stories are pre-tested for clarity and cultural sensitivity.

Modelling the effect of comprehensive campaigns

To estimate the potential effect of a comprehensive campaign, we gathered evidence from previous multiple-issue media campaigns to predict how much they could increase coverage of key interventions (such as breastfeeding, or seeking treatment for pneumonia). We adjusted our predictions for service provision and media penetration in each country. We then analysed the effect on mortality of these increases in intervention coverage in a range of sub-Saharan African countries using the Lives Saved Tool (LiST). LiST predicts that a sustained, comprehensive campaign could reduce under-5 mortality by between 16% and 23% during the third and subsequent years of a campaign.

If these predictions are correct, mass media campaigns would be among the most cost effective of all currently available health interventions. We compared the cost of our campaigns (per disability-adjusted life year saved, DALY) with other interventions. WHO has used a rule of thumb that states that the cost-effectiveness of any intervention that costs below US\$100 per DALY averted is “good”, and below \$25 is “excellent”.²⁵ The most cost-effective intervention evaluated in Disease Control Priorities in Developing Countries^{26,27} is childhood immunisations (\$1–8 per DALY averted). We estimate that saturation-based media campaigns cost \$1–10 per DALY to deliver.

Putting these predictions to the test

We are currently running a 35 month cluster-randomised trial in Burkina Faso, funded by the Wellcome Trust and Planet Wheeler Foundation, to evaluate the effect of a comprehensive mass media campaign on child mortality (ClinicalTrials.gov, number NCT01517230). The trial is, to our knowledge, the largest, most rigorous evaluation ever conducted of a mass media intervention in a low-income setting.

We have been able to solve, exceptionally, the problem of randomising a mass media intervention by choosing a country (Burkina Faso) where local media is very strong and national media is relatively weak. Burkina Faso was the first country in Africa to allow private FM radio stations. These stations broadcast in local languages, whereas the national station broadcasts most of its outputs in French. The result is that in most locations, national radio achieves only a 10% market share or less (unpublished). Thus we are able to use local FM radio stations with limited range to broadcast our messages to seven intervention areas without leaking into the seven control areas and without

For the Lives Saved Tool see
<http://www.jhsph.edu/departments/international-health/centers-and-institutes/institute-for-international-programs/list>

sacrificing the factor crucial to the power of mass media (ie, that most people are listening). This is an exceptional situation, and randomised trials remain challenging in most countries in the world, particularly where TV viewing is high (since television is usually a national channel).

The appendix shows our seven intervention areas and the seven control areas. It shows the areas predicted by computer terrain modelling to receive signal strength of 48 dB μ or more (using DBS Consulting).

The evaluation, led by The London School of Hygiene & Tropical Medicine (LSHTM), London, UK, and Centre Muraz, Bobo-Dioulasso, Burkina Faso, includes baseline and endline mortality surveys, as well as baseline, midline, and endline behavioural surveys. The baseline survey was done before radio broadcasts began in March, 2012, and the endline survey began in November, 2014, with full trial results expected in late 2015. An economic evaluation, led by Jo Borghi and Anne Mills at LSHTM will also measure the cost-effectiveness of the intervention, particularly when modelled at a national scale in Burkina Faso and elsewhere in Africa.

Implications of our work

If the trial yields results that are broadly consistent with the predictions of our model, the implications for the public health community will be substantial. Our model predicts that if comprehensive campaigns are implemented in ten African countries for 5 years, one million lives of children younger than 5 years should be saved. If this claim is sustained by the trial, saturation-based media campaigns should belong in the mainstream of public health interventions and a priority for governments.

There might also be a wider lesson to be learned as we think beyond the conventional definition of health systems. Murray²⁹ has argued that each year of extra schooling for mothers leads to a 6–12% reduction in the national child mortality rate, while a 50% increase in government health expenditure generates just a 7% reduction. Too narrow a focus on health systems could mean that we are missing structures that are under our noses. Every country has a transport system, a waste disposal system, an education system, and a media system. Clearly, health services will and should remain the priority for public health investment, but other systems also have an important part to play.

Contributors

RH and SC devised the approach to modelling the impact of mass media campaigns together, designed and initiated the scientific trial and conceptualised this paper. RH and JM reviewed the literature and RH is the primary author. WS helped to conceptualise the paper and wrote the initial draft. Revised impact projections were modelled by JM with input from all co-authors. LD, WS and RH described the Saturation+ methodology. SC, SS, NM and MO are evaluating the trial in Burkina Faso. All authors reviewed successive drafts, made substantial inputs and approved the final paper. RH is the overall guarantor and corresponding author.

Declaration of interests

We declare no competing interests.

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References

- 1 United Nations Children's Fund. Facts for life, 4th Edn. 2010 New York: UNICEF. http://www.unicef.org/publications/index_53254.html (accessed July 29, 2014).
- 2 Countdown to 2015. Fulfilling the health agenda for women and children: the 2012 report. <http://www.countdown2015mch.org/reports-and-articles/2012-report> (accessed July 29, 2014).
- 3 Hornik RC. Public health communication: making sense of contradictory evidence. In: Hornik RC, ed. *Public health communication: evidence for behaviour change*. Mahwah, New Jersey: Lawrence Erlbaum, 2002: 1–22.
- 4 de Vroome EM, Paalman ME, Sandfort TG, Sleutjes M, de Vries KJ, Tielman RA. AIDS in The Netherlands: the effects of several years of campaigning. *Int J STD AIDS* 1990; 1: 268–75.
- 5 Dubois-Arber F, Jeannin A, Konings E, Paccaud F. Increased condom use without other major changes in sexual behavior among the general population in Switzerland. *Am J Public Health* 1997; 87: 558–66.
- 6 Zimicki S, Hornik RC, Verzosa CC, et al. Improving vaccination coverage in urban areas through a health communication campaign: the 1990 Philippines experience. In: Hornik RC, ed. *Public health communication: evidence for behaviour change*. Mahwah, New Jersey: Lawrence Erlbaum, 2002: 197–218.
- 7 Grilli R, Ramsay C, Minozzi S. Mass media interventions: effects on health services utilisation. *Cochrane Database Syst Rev* 2002; 1: CD000389.
- 8 Bala M, Strzeszynski L, Cahill K. Mass media interventions for smoking cessation in adults. *Cochrane Database Syst Rev* 2008; 1: CD004704.
- 9 The US Community Preventive Services Taskforce. Reducing tobacco use and secondhand smoke exposure: mass-reach health communication interventions. Task Force Finding and Rationale Statement. 2013 <http://www.thecommunityguide.org/tobacco/RRmassreach.html> (accessed July 29, 2014).
- 10 Elder RW, Shults RA, Sleet DA, et al. Effectiveness of mass media campaigns for reducing drinking and driving and alcohol-involved crashes: a systematic review. *Am J Prev Med* 2004; 27: 57–65.
- 11 Farquhar JW, Fortmann SP, Flora JA, et al. Effects of communitywide education on cardiovascular disease risk factors. The Stanford Five-City Project. *JAMA* 1990; 264: 359–65.
- 12 COMMIT Research Group. Community Intervention Trial for Smoking Cessation (COMMIT). I. Cohort results from a four-year community intervention. *Am J Public Health* 1995; 85: 183–92.
- 13 Development Media International. Previous campaigns. <http://developmentmedia.net/previous-campaigns> (accessed July 29, 2014).
- 14 Edwards T, Harding-Esch EM, Hailu G, et al. Risk factors for active trachoma and *Chlamydia trachomatis* infection in rural Ethiopia after mass treatment with azithromycin. *Trop Med Int Health* 2008; 13: 556–65.
- 15 Edwards T, Cumberland P, Hailu G, Todd J. Impact of health education on active trachoma in hyperendemic rural communities in Ethiopia. *Ophthalmology* 2006; 113: 548–55.
- 16 Development Media International. Ethiopia trachoma campaign (2001–03). <http://developmentmedia.net/ethiopia-trachoma-campaign-2001-03> (accessed July 29, 2014).
- 17 BBC World Service Trust Cambodia MCH and HIV/AIDS campaign 2004–06. <http://www.developmentmedia.net/cambodia-hiv-aids-and-mch-campaign-2006> (accessed July 29, 2014).
- 18 DMI Orissa Maternal and Child Health Campaign, 2009. <http://www.developmentmedia.net/india-maternal-and-child-health-campaign-2009> (accessed July 29, 2014).
- 19 McDivitt JA, Zimicki S, Hornik R, Abulaban A. The impact of the Healthcom mass media campaign on timely initiation of breastfeeding in Jordan. *Stud Fam Plann* 1993; 24: 295–309.

For more on DBS Consulting see <http://www.dbsconsult.co.uk>

- 20 Worden JK, Flynn BS, Geller BM, et al. Development of a smoking prevention mass media program using diagnostic and formative research. *Prev Med* 1988; **17**: 531–58.
- 21 Noar SM. A 10-year retrospective of research in health mass media campaigns: where do we go from here? *J Health Commun* 2006; **11**: 21–42.
- 22 Wakefield MA, Loken B, Hornik RC. Use of mass media campaigns to change health behaviour. *Lancet* 2010; **376**: 1261–71.
- 23 Viswanath K, Finnegan JR Jr. Reflections on community health campaigns: secular trends and the capacity to effect change. In: Hornik RC, ed. *Public health communication: evidence for behaviour change*. Mahwah, New Jersey: Lawrence Erlbaum, 2002: 197–218, 289–314.
- 24 Levy D, Maria de Almedia L, Szklo A. The Brazil SimSmoke policy simulation model: the effect of strong tobacco control policies on smoking prevalence and smoking-attributable deaths in a middle income country. *PLoS Med* 2012; **9**: e1001336.
- 25 WHO. Investing in health research and development: report of the ad hoc committee on health research relating to future intervention options. 1996 World Health Organization: Geneva. http://whqlibdoc.who.int/hq/1996/TDR_Gen_96.1_pp1-34.pdf (accessed Aug 15, 2014).
- 26 Jamison DT, Breman JG, Measham AR. *Disease control priorities in developing countries* 2nd edn. 2006; Oxford University Press and The World Bank, 35–86.
- 27 Laxminarayan R, Mills AJ, Breman JG, et al. Advancement of global health: key messages from the Disease Control Priorities Project. *Lancet* 2006; **367**: 1193–208.
- 28 Murray C. Accelerating progress with increased efficiency, innovation, and maternal education: presentation at the Call to Action Summit, 15th June 2012. <http://5thbdy.usaid.gov/pages/responsesub/CallToAction.aspx> (accessed July 29, 2014).

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Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

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Table 1: Evidence from media campaigns overseen by first author

Country	Year	Campaign	Indicator	Type	Baseline	Endline
India	1999-00	Leprosy	People unwilling to sit beside person with leprosy	Reported	47%	27%
Nepal	2002-3	Trachoma	Children observed with clean hands	Observed	67%	90%
Nepal	2002-3	Trachoma	Households reporting eye problems within last year	Reported	64%	29%
Brazil	2003	Leprosy	Calls to leprosy hotline (nationwide over one month)	Observed	6 per day	477 per day
Ethiopia	2002-5	Trachoma	Children observed with clean hands	Observed	26%	74%
Ethiopia	2002-5	Trachoma	Trachoma prevalence (in areas receiving no antibiotics)	Observed	72%	52%
Brazil	2006	Tuberculosis	Laboratory tests for TB (nationwide over three months)	Observed	248,464	312,781
Cambodia	2004-6	MCH	Pregnant women using iron supplements	Reported	10%	44%
Cambodia	2004-6	MCH	Pregnant women attending ante-natal check-ups	Reported	63%	76%
India	2009	MCH	Women planning to give birth in a health facility	Reported	76%	91%
India	2009	MCH	Baby breastfed within an hour of birth	Reported	77%	91%

Figure 1: Burkina Faso map of control and intervention clusters.

