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Effect of media use on mothers' vaccination of their children in sub-Saharan Africa

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ABSTRACT

While several studies have examined the crucial role that parents' vaccination behaviors play in reducing disease spread and severity among children, few have evaluated the connection between parents' media use and their decision on whether or not to vaccinate their child, specifically in relation to the BCG (Bacillus Calmetter Guerin), DPT (Diptheria, Pertussis, Tetanus) polio, and measles vaccines. Media channels are a critical source of health information for parents, which is especially true in Sub-Saharan Africa, as there is often a dearth of local healthcare providers. The aim of this paper is to investigate the role that media use plays in a mothers' choice to vaccinate their infant children in sub-Saharan Africa, specifically focusing on whether media use is associated with socioeconomic status (SES) and a mothers' vaccination of their children. Cross-sectional data from the Demographic Health Surveys of 13 sub-Saharan countries (2004–2010) were pooled. A multivariate Poisson regression of 151,209 women was used to calculate adjusted relative ratios and 95% confidence intervals for the associations among SES, media use, and immunization. Education and wealth were found to be strongly and positively associated with vaccine-uptake behaviors. The effects of media use (radio and television) were found to be associated with the relationships between SES and vaccine uptake. However, it did not reduce the impact of SES on vaccination. These findings indicate that mass media may be an important tool for future efforts to reduce the health discrepancies between children from high- and low-socioeconomic backgrounds. Going forward, immunization strategies should include communication plans that will address and mitigate potential immunization disparities among parents of different SES backgrounds.

1. Introduction

Vaccination is considered the most effective, cost-beneficial means of preventing the contraction of an infectious disease [1,2] Successful immunization programs have considerably reduced the burden of many preventable infectious diseases and have greatly contributed to the improvement of global health [3,4]. Vaccination is recognized as an integral part of public health policies, and each country enforces vaccination requirements to achieve satisfactory vaccine coverage.

National immunization programs (NIPs) have been adopted by many governments in order to focus national efforts toward sustaining and/or improving the immunization rates of their population. NIP's do not include all vaccines, but only those that have been proven to be relatively safe and cost-effective. As vaccinations involve injecting foreign substances into a body, there is a possibility of mild to severe adverse reactions and potential vaccine side effects that people may be exposed to. Therefore, only vaccines that have sufficient preventive effects and are cost-effective are included in a NIP [5,6]. Despite vaccine's great value for improving public health, population-based campaigns implemented as part of a NIP can be both administratively and economically burdensome [7,8]. Therefore NIPs often differ by country, but most developed countries NIP's promote the following vaccinations: diphtheria, polio, pertussis, measles, tetanus, tuberculosis, hepatitis B, mumps, rubella, chicken pox, Japanese encephalitis, typhoid fever, influenza, and viral hemorrhagic fever [9]. Not all of the above listed vaccines are promoted for all segments of the population, and in some cases NIPs recommend a vaccine only for certain high-risk populations [3].

The vaccination of children at a young age against tuberculosis, poliomyelitis, diphtheria, and measles has been well documented as an effective strategy to reduce related morbidity and mortality [3,10]. Nonetheless, every year a majority of African children do not

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receive these vaccinations. Vaccination avoidance by mothers leads directly to lower vaccination rates among their children, increasing the social risk of infection [11] and reducing herd immunity. A mother's reluctance to vaccinate their children may stem from individual medical (e.g., access) or psychological (e.g., fear) reasons, however other factors, such as health communication, socioeconomic status (SES), and cultural or religious backgrounds, may also play a role [12–15].

Despite a trend towards higher vaccination rates worldwide, many children remain at risk for vaccine-preventable diseases, especially in developing countries [16,17]. This can be clearly seen through the example of the bacillus Calmette–Guérin (BCG) vaccine. Although the BCG is reported as very effective for preventing tuberculosis and tuberculous meningitis in the pediatric age group [18,19] the BCG vaccination rate in sub-Saharan Africa is 10–20% lower than the rates in Western countries (Table 1). Vaccination rates have been reported to vary by socioeconomic status and the use of mass media [20]. However, little is known about the strength of those associations in sub-Saharan Africa and to what extent the use of media influences the relationship between SES and the immunization rate [21]. Media are a significant source of information on health in a range of countries, and may be the only source in countries with weaker health systems.

While media use has exploded across the globe since the start of the Twenty-first Century, aging and outdated telecommunications systems have caused Sub-Saharan Africa to lag behind the rest of the globe in mass media use [22,23]. People in sub-Saharan Africa still use radio as their major source of information [24], and only 5.2% of all African households have a television set. 36.9% of African households subscribe to a mobile communication service [25,26].

The strategic use of mass media can play a significant role in promoting awareness, increasing knowledge and changing health-related behaviors [7]. Mass media campaigns have been reliably linked to an increase in awareness of HIV/AIDS among individuals in low-income countries (LICs) [27], including increased awareness of the ways by which the virus is transmitted and knowledge about preventive measures [28]. While the contributions of the various mass media types to health awareness are widely acknowledged, not all groups have equal access to health information [29] or to media that provide such information—a phenomenon described as communication inequalities [21]. Communication inequalities include differences among social groups in the generation, manipulation, and distribution of information at the group level, as well as differences in access to, and ability to take advantage of, information at the individual level [21]. We hypothesize that while communication inequalities are driven by social determinants such as class, the role of social determinants on health outcomes may be compounded by unequal access to media. Therefore, we must pay close attention to how social determinants, media access, and media use influence immunization coverage for children, particularly in LICs.

As few reports have been conducted on the association between media use and immunization rates in sub-Saharan Africa, this study uses nationally representative surveys from sub-Saharan African countries to investigate the relationship between media use and childhood immunization. Specifically, we examined whether the relationship between social determinants and vaccine-related outcomes is associated with the use of mass media (Fig. 1).

Table 1
Vaccination coverage by vaccine and WHO region, by weighted regional average (%).

Region	Vaccination coverage					
	BCG	DTP 3 doses	Polio 3 doses	MCV first dose	Hepatitis B 3 doses	Hib 3 doses
Global	**90**	**85**	**86**	**85**	**75**	**42**
WHO region						
African	85	77	79	76	76	62
American	96	93	93	93	89	92
Eastern Mediterranean	88	87	87	85	84	58
European	94	96	96	95	78	75
South-East Asia	89	77	77	79	52	9
Western Pacific	97	96	96	97	91	10

Source: WHO Weekly epidemiological record No. 46, 2011, 86, 509–513. (http://www.who.int/wer).

2. Materials and methods

2.1. Study sample

The data used in this study come from the Demographic and Health Surveys (DHS) conducted in sub-Saharan African countries between 2004 and 2010. The DHS are nationally representative surveys of between 5000 and 15,000 households that are performed every five years to allow for temporal analyses. The DHS adopts a standardized questionnaire to ensure comparability among countries, particularly among LICs [30,31]. Participants in DHS are recruited through the use of a multistage cluster-sampling procedure that includes stratification for different regions, accounting for urban and rural areas. The primary sampling units in our study were the same geographical living areas as contained within the DHS data. The geographical areas were census enumeration blocks in urban areas and villages in rural areas. Each country's sample size was calculated by applying that country's urban and rural population proportions and the country's gender ratio. The DHS collects information via face-to-face interviews that include questions on mass media use, vaccination status, and SES. The DHS response rates in all African countries were higher than 90%. We utilized the entire dataset for sub-Saharan African countries available from the USAID website (http://dhsprogram.com/) during the initial phase of the study (February 2012). We included data for all sub-Saharan African countries that had information on the four types of vaccination and on media use. The dataset were representative of the different regions of sub-Saharan Africa. We then created a pooled dataset for the thirteen countries that met those data requirements. The data for each country differed by survey year because of country-specific situations. From that dataset, women aged 15 years or older who have at least one child less than 5 years old were proportionally selected by ages, based on the country's census data [30,31]. To generate a large dataset with sufficient statistical power to investigate the effect of media use on vaccination, data were pooled from 13 sub-Saharan African countries ($N = 151{,}209$).

2.2. Study design

The decision to vaccinate children is influenced by the exposure to mass media and other information sources available to mothers [32,33]. People with greater access to health-related information, and those who obtain sufficient information, tend to have a higher rate of vaccine uptake than those with less access or who are less active in their search for information [33–35]. To determine the relative importance of factors associated with vaccination, there was a specific focus on the relationship between mothers' SES, mothers' media use, and their children's vaccine uptake. We developed study designs and statistical techniques based on our previous studies [33].