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From the Editor-in-Chief

This issue of *World Health & Population* presents papers that have been published online by *WHP* and are selected here as representative of recent interesting contributions to the journal. Three of the five articles focus on research in sub-Saharan African countries; one is a study of traffic safety in urban China; and one is a broader study of the provision of short-term medical assistance by outside teams travelling for service trips to resource-constrained, high-medical-need areas.

Domestic partner violence is a serious issue for all countries and cultures. In the first article in this issue of *WHP*, Uthman et al. utilize Demographic and Health Survey (DHS) data for 17 sub-Saharan countries to look at dimensions of gender inequality as predictors of acceptance of partner violence as a societal/cultural norm, thus enabling it to occur. Individual-level measures of gender inequality included age, education, employment and presence of more than one wife in the family. Community-level measures included median age of marriage, average household size, and ratio of educated and employed men to women in the community. Finally, the country's Gender-related Development Index (GDI) was included as a societal measure. A number of interesting results are reported, with community and societal measures remaining significant even after accounting for individual factors. This research outcome in particular supports the authors' conclusion that societal-level programs and policy are also necessary if we are going to address what is commonly seen as a private, domestic issue.

The second article in this issue is a brief communication on the state of environmental health at public and private schools in southeastern Nigeria. Both kinds of schools score quite dismally on the school health program evaluation (SHPE) scale, with public schools faring much worse in comparison. Although not an encouraging assessment, this article by Ezeonu and Anyansi provides useful benchmarks going forward, as Nigeria strives to provide a safe, clean, and healthy physical and social environment for all its schools.

"Mortality, Nutrition and Health in Lofa County, Liberia: Five Years Post-Conflict," our third offering in this issue, is a robustly designed study by Doocy, Lewey et al. that provides a public health snapshot from an extraordinarily difficult post-war situation. The area of Liberia that the study examines was among the most terribly affected by the 15-year conflict, with over 90% of the population displaced. According to the study, however, the current population health status in Lofa County is generally comparable with that of the rest of Liberia. The need for reconstruction and development across the country remain very great; data from studies such as this one usefully serve to inform programming by both the government and international aid organizations.

Zhang et al. report in our fourth article on knowledge and awareness interventions for middle- and high-school-aged students in Beijing. Overall, China has experienced a huge increase in motor vehicle use in the last 20 to 30 years, and the country's economic growth promises only more vehicles in the future. China's relative inexperience with vehicular traffic is reflected in the fact that the first national laws relating to road safety were passed only in 2003. This article, "Evaluation of a School-

Based Intervention to Reduce Traffic-Related Injuries among Adolescents in Beijing," found that knowledge and awareness regarding traffic safety increased in intervention schools, compared with non-equivalent comparison group schools that did not implement the program. Interestingly, results were better for the younger, middle-school student groups, as well as for females as compared to males. The authors conclude that age and gender-specific interventions may be necessary to develop uniform knowledge of traffic safety practices. It is certainly important in any case that driver education efforts be initiated with these populations prior to their taking up the wheel on increasingly crowded Chinese roads.

In the final article in this issue, Chapin and Doocy fill an important gap with the article "International Short-term Medical Service Trips: Guidelines from the Literature and Perspectives from the Field." Medical service trips are normally seen as clear win–win opportunities – meeting a local medical need, providing a sense of humanitarian service for the visiting medical professionals, providing instruction and training for local healthcare providers, giving the visitor (and possibly his or her spouse) an opportunity to travel, and so forth. Unfortunately, however, the growth of interest in participating in medical missions has not been accompanied by international guidelines and standardization to assure consistent quality in service delivery, outcomes and follow-up. Too often, less-than-qualified people travel with the best of intentions to help and "do good," but end up being more of a burden than a contributor. This article provides steps to begin to address this problem, among others, identified by the authors regarding medical service projects.

In conclusion, we hope that you find the papers in this issue interesting and worthwhile, and that you will also consult others recently released articles online at www.worldhealthandpopulation.com. *WHP* remains committed to its mission to provide a forum for researchers and policy makers worldwide to publish and disseminate health- and population-related research, and to encourage applied research and policy analysis from diverse global settings. *WHP* is indexed on MEDLINE and is accessible through PubMed.

We look forward to continued enthusiastic submission of manuscripts for consideration, peer review and publication. Finally, the editors and publishers of *WHP* are always interested in any comments or suggestions you might have on the papers or about the journal and our mission. Please feel free to write or e-mail us.

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The Role of Individual, Community and Societal Gender Inequality in Forming Women's Attitudes toward Intimate-Partner Violence against Women: A Multilevel Analysis

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Abstract

Background: Establishing risk factors for intimate partner violence against women (IPVAW) is crucial for addressing women's health and development. Acceptance of IPVAW has been suggested as one of the strongest predictors of IPVAWs. The aim of this study was to examine the independent contributions of individual, community, and societal measures of gender inequality in forming women's attitudes toward IPVAW.

Methods: We applied multivariable multilevel logistic regression analysis to Demographic and Health Survey data for 120,467 women nested within 7,463 communities from 17 countries in sub-Saharan Africa.

Results: We found that women whose husband had higher education (odds ratio [OR] = 1.06; 95% confidence interval [CI] 1.02 to 1.10) and women whose husband had more than one wife (OR = 1.14; 95% CI 1.09 to 1.19) were more likely to accept IPVAW than other women. Unemployed women with an unemployed partner were more likely to justify IPVAW than employed women with working

partners (OR = 1.32; 95% CI 1.08 to 1.61). Both community and societal measures of gender inequality were associated with women's attitudes toward IPVAW, even after controlling for gender inequality at the individual level. There was evidence of clustering of women's attitudes within communities and within countries.

Conclusion: We provide evidence that community and societal forms of gender inequality influence women's attitudes toward IPVAW beyond individual factors. Choices women make are important, but community and society also impose restraints on women's attitudes toward IPVAW. Thus, policies and programs aimed at reducing or eliminating IPVAW must address people, the communities and societies in which they live in order to be successful.

Introduction

Intimate-partner violence against women (IPVAW) appears to have occurred from the beginning of societies (Sarkar 2008). A recent study by the World Health Organization confirmed that IPVAW is widespread and a serious form of human rights abuse as well as a public health issue (Ellsberg et al. 2008; Garcia-Moreno et al. 2006). Violence places a serious health burden on women and their children, and its role is amplified through its connection to the rising tide of HIV (Dunkle et al. 2004, 2006; Garcia-Moreno and Watts 2000). Establishing risk factors for IPVAW is crucial for addressing women's health and development. A consensus is emerging that a combination of personal, economic, social and cultural factors may be associated with IPVAW (Naved and Persson 2005). Despite this consensus, most studies of IPVAW explore individual-level factors, whereas community or societal factors remain generally unexplored (Naved and Persson 2005). Acceptance of IPVAW is a factor that has been suggested as one of the strongest predictors of IPVAW (Faramarzi et al. 2005). A troubling aspect of IPVAW is its benign social and cultural acceptance in several parts of the world as a means of physically chastising women – the husband's right to "correct" an erring wife (Counts et al. 1992; Visaria 2000). Available research suggests that women's susceptibility to IPVAW is greatest in societies where the use of violence in many situations is a socially accepted norm (Jewkes 2002). A large proportion of women in these societies considered "arguing with husband" and "refusing sex" as valid reasons for wife beating (Rani and Bonu 2009). Women's own condemnation of this behaviour may, therefore, be an important element in changing it (Schuler and Islam 2008). If women do not confront men because of the threat of domestic violence, the widespread acceptance of IPVAW may also become a major hurdle to the success of other initiatives. These include reproductive health programs (i.e., family planning), care seeking for sexually transmitted diseases or voluntary testing and counselling for HIV, and condom use for prevention of HIV/AIDS.

Drawing largely on feminist theory (Lenton 1995a, 1995b) and imbalance theory of resources and power (Choi and Ting 2008; Cubbins and Vannoy 2005; Goode 1971), we developed a working conceptual framework to help choose variables for exploring the role of proximate and distal gender inequalities in forming women's attitudes toward IPVAW. Variables included here relate to the larger society, immediate social context, immediate family context, spousal relation factors and individual factors concerning both partners. Our approach to understanding the origins of women's attitudes toward IPVAW focused on the dynamics of men's and women's behaviours and the resources that each partner brings to the conjugal union. We identified five general domains that reflect underlying power disparities or restrictions on women's options within unions: (1) age, (2) education, (3) occupation, (4) decision-making autonomy, and (5) household stressors. Within these five domains, gender inequality in marriages or societies may create the terms for the kind of "sexual contract" that places women at a disadvantage (Dunkle et al. 2004; McCloskey et al. 2005), setting the stage for acceptance of IPVAW. Effective programming for gender inequality and IPVAW requires a comprehensive approach that incorporates strategic linkages to facilitate and reinforce the goals of the UN Millennium Project's Task Force on Gender Equality (UN Millennium Project 2005, United Nations Population Fund 2007). Seven strategic priorities have been advocated to achieve Millennium Development Goal 3, "Promote gender equality and empower women." These

include reducing gender inequality and disadvantage in terms of education; sexual and reproductive health and rights; time burden; property and inheritance rights; employment and wages; political participation in parliament and local governments; and violence against women (UN Millennium Project 2005; United Nations Population Fund 2007).

To our knowledge, no multilevel study to date has examined the independent contributions of individual, community and societal gender inequality in forming attitudes toward IPVAW among women in sub-Saharan Africa. Thus, the aim of this study is to fill this research gap. Without objective information about the important factors forming women's attitudes towards IPVAW, it is difficult to plan substantial public health programs that could prevent the occurrence of IPVAW.

Subjects and Methods

Data

This study used data from 17 Demographic and Health Surveys (DHS) conducted between 2003 and 2007 in sub-Saharan Africa. Methods and data collection procedures have been published elsewhere (Measure DHS 2008). The survey's questionnaires were similar across countries, yielding inter-country comparable data. Only countries with available data on attitudes toward IPVAW were included in the study; they were Benin, Burkina Faso, Ethiopia, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mozambique, Namibia, Nigeria, Rwanda, Swaziland, Tanzania, Uganda and Zimbabwe. For the purpose of our study, we pooled data from these 17 countries into one data set. Country-level data (gender-related development index) were collected from the reports published by the United Nations Development Program (UNDP 2008).

Outcome Variable

The analysis presented in this study was restricted to ever-married women. The category "ever married" includes women currently married, formally married women and unmarried women who are living with a man as if married. To assess the degree of acceptance of wife beating, respondents were asked the following question: "Sometimes a husband is annoyed or angered by things which his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations?" The five scenarios presented to respondents for their opinions were (1) "If the wife burns the food," (2) "If the wife argues with the husband," (3) "If the wife goes out without informing the husband," (4) "If the wife neglects the children," and (5) "If the wife refuses to have sexual relations with the husband." A binary outcome variable was created for acceptance of wife beating, coded as zero (0) if the respondent did not agree with any of the situations when the husband is justified in beating the wife or did not have any opinion on the issue, and coded as one (1) if the respondent agreed with at least one situation where the husband is justified in beating the wife.

Explanatory Variables

To explain the role of proximal and distal gender inequalities in forming women's attitudes toward IPVAW, we adopted an ecological framework in which the propensity to justify IPVAW is a function of individual-, community-, and societal-level variables. Seven variables characterizing individual-level measures of gender inequality were included. They were (1) spouses' relative education, (2) spousal age gap, (3) employment discrepancy, (4) polygamy, (5) parity, (6) early marriage, and (7) decision-making power. Birth cohort was included as a partial control for a period trend to control for effects of unknown factors that may have been introduced due to different timing of surveys across countries. In terms of community-level measures of gender inequality, we considered (1) community median age of marriage, (2) average household size, (3) average spousal age gap, and (4) ratio of educated and employed men to women in the community. Place of residence was also included as a control variable at the community level. The Gender-related Development Index (GDI), which reflects gender disparities in basic human capabilities, was used as a measure of societal-level gender inequality. The full definition for each explanatory variable is given in Table 1.

Table 1. Variables and definitions

Variable	Definition
Individual-level factors	
Birth cohort	Self-reported year of birth was categorized into (1) 1936 to 1945, (2) 1946 to 1955, (3) 1956 to 1966, or (4) 1966 to 1975
Spouses' relative education	Categorized into (1) wife has same, (2) wife has less, (3) wife has more, or (4) both uneducated
Spousal age gap	Calculated from respondent report of her own and husband's age
Employment discrepancy	Categorized into (1) both working, (2) only man working, (3) only woman working, and (4) both unemployed
Polygyny	Husband has other wives (yes or no)
Parity	Self-reported number of children ever born.
Early marriage	Married before the age of 18 (yes or no)
Decision-making power	Women's decision autonomy was assessed by inquiring about who bore the responsibility of making decisions on household purchases including small and large ones, visiting relatives and friends, spending the wife's earnings, and the number of children to have. For these variables, response options were "husband," "wife" or "both husband and wife." We created an additive scale (from 0 to 5) that counted the number of domains in which each (husband/partner alone, wife alone and couple) had the final word.
Community-level factors	
Place of residence	Cluster classification: urban or rural areas
Median age of marriage	Median age of marriage in community
Average household size	Mean number of household members in community
Average spousal age gap	Mean difference in reported age between husband and wife in community
Ratio of educated men to women in the community	Ratio of percentage of men with at least primary education to percentage of women with at least primary education in community
Ratio of employed men to women in the community	Ratio of percentage of men currently employed to percentage of women currently employed in community
Societal-level factors	
Gender-related development index	Measures gender disparities in the areas of life expectancy at birth; education, by adult literacy rate combined with the primary, secondary, and tertiary gross enrolment ratio; and estimated earned income (purchasing power, parity of US dollars). These areas of measurement refer to the "gendered gap" that exists between men and women in their access to economic and social resources and services due to women's disadvantaged position in society

Statistical Analyses

We used multilevel multivariable logistic regression to analyze the association between attitudes toward IPVAW and proximal and distal measures of gender inequality. We specified a 3-level model for binary response reporting acceptance of IPVAW or not, for individuals (Level 1), living in a community (Level 2), from a country (Level 3). We fitted a model that included individual, community and societal gender inequality measures (the "full model"). Prior to examining the full model, an unconditional model (i.e., an "empty model") was specified to decompose the amount of variance between community and country levels. Measures of random effects included intracluster correlation (ICC).

The ICC was calculated by the linear threshold according to the formula used by Snijders and Bosker (1999). We checked for multi-collinearity among exposure variables examining the variance

inflation factor (VIF) (Tu et al. 2004, 2005). Regression estimates were calculated by means of the reweighted iterative generalized least square algorithm using MLwiN 2.10 (Rashbash et al. 2004). In the multilevel logistic regression models, second-order penalized quasi-likelihood (PQL) estimation was used (Goldstein 2003). The statistical significance of covariates was calculated using the Wald test (Rashbash et al. 2008). All significance tests were two-tailed, and statistical significance was defined at the 5% alpha level.

Results

Sample Characteristics

The countries, year of data collection, final sample and number of communities sampled per country are listed in Table 2. The median number of communities sampled was 405, ranging from 274 in Swaziland to 750 in Benin. The percentage of women with acceptance of IPVAW in at least one situation varied across countries, from 20% in Swaziland to almost 80% in Ethiopia. Table 3 presents descriptive statistics for the final pooled sample. For this analysis, information on 120,467 women (Level 1) nested within 7,463 communities (Level 2) from 17 countries (Level 3) in sub-Saharan Africa was pooled into one data set. The overall percentage of women with a positive attitude toward IPVAW was 55%. Only 10% of the women had more education than their partners. The median spousal age gap was 6 years (interquartile range 7). About 40% of women's husbands had another wife. Half of the women had married before the age of 18 years.

Table 2. Description of Demographic and Health Surveys data 2003–2007 in sub-Saharan Africa among women by country, survey year, sample size, response rates and attitudes toward intimate-partner violence against women (IPVAW)

Country	Survey year	Number of women	Number of communities	Justified IPVAW (%)
Benin	2006	14,338	750	51.6
Burkina Faso	2003	10,042	400	74.6
Ethiopia	2005	10,240	535	79.7
Ghana	2003	4,182	412	54.0
Kenya	2003	5,729	399	70.6
Lesotho	2004	4,737	405	49.6
Liberia	2007	5,186	298	60.3
Madagascar	2004	6,036	300	28.5
Malawi	2004	9,801	521	29.2
Mozambique	2003	10,157	604	54.5
Namibia	2007	4,259	500	38.4
Nigeria	2003	5,533	362	66.4
Rwanda	2005	6,993	462	47.0
Swaziland	2006	2,501	274	20.0
Tanzania	2004	7,805	475	57.6
Uganda	2006	6,473	368	72.0
Zimbabwe	2006	6,455	398	49.7

Table 3. Summary of sample characteristics

Variable	Number (%)
Acceptance of IPVAW	
No	54,065 (44.9)
Yes	66,402 (55.1)
Level 1: Individuals	120,467 (100)
Birth cohorts	25,132 (20.9)
1936–1945	24,772 (20.5)
1946–1955	26,982 (22.4)
1956–1965	23,682 (19.7)
1966–1975	19,899 (16.5)
Spouses' relative education	
Wife has same	40,420 (33.6)
Wife has less	32,200 (26.7)
Wife has more	13,063 (10.8)
Both uneducated	30,726 (25.5)
Spousal age gap (years), median (IQR)	6.0 (7)
Employment discrepancy	
Both working	89,038 (73.9)
Only man working	27,966 (23.2)
Only woman working	558 (0.5)
Both not working	717 (0.6)
Polygyny	
No	73,183 (60.8)
Yes	47,284 (39.2)
Decision-making indices	
Respondent alone (0–5)	
0	40,080 (33.3)
1	31,360 (26)
2	21,074 (17.5)
3	10,984 (9.1)
4	5,793 (4.8)
5	11,176 (9.3)

Table 3. Continued.

Variable	Number (%)
Husband/partner alone (0–5)	
0	63,769 (52.9)
1	18,345 (15.2)
2	12,704 (10.6)
3	9,677 (8)
4	4,989 (4.1)
5	
Husband–wife (0–5)	
0	55,920 (46.4)
1	14,757 (12.2)
2	13.647 (11.3)
3	13,733 (11.4)
4	13,413 (11.1)
5	8,997 (7.5)
Number of children, median (IQR)	3.0 (3)
Early marriage	
No	60,927 (50.6)
Yes	59,540 (49.4)
Level 2: Communities	**Median (IQR)**
Place of residence , number (%)	
Urban	35,739 (29.7)
Rural	84,728 (70.3)
Median age of marriage	17.5 (2.5)
Average household size	5.8 (1.9)
Average spousal age gap	7.2 (3.7)
Ratio of educated men to women	1.1 (0.5)
Ratio of employed men to women	1.3 (1.1)
Level 3: Countries	**Number (%)**
GDI	
Low	61,571 (51.1)
Medium	31,995 (26.6)
High	21,715 (18.0)

GDI = Gender Development Index; IQR = interquartile range.

Measures of Variations (Random Effects)

The results of the unconditional model showed that approximately 20% and 14% of the variance in the log odds of justifying IPVAW could be attributed to the community ($\tau = 0.695$; $p = .004$) and country levels ($\tau = 0.989$; $p < .0001$), respectively. Variations across communities and countries remained statistically significant, even after controlling for individual-, community-, and country-level factors (Table 4), thereby lending support for the use of multilevel modelling to account for community and country variations.

Table 4. Individual-, community- and country-level gender inequality associated with attitudes toward intimate-partner violence against women (IPVAW) identified by multivariable multilevel logistic regression, sub-Saharan Africa

Variable	Empty Model[a]	Full model[b]
		OR (95% CI)
Level 1: Individuals		
Birth cohorts		0.66 (0.62, 0.72)***
1936–1945		0.69 (0.64, 0.73)***
1946–1955		0.76 (0.71, 0.80)***
1956–1965		0.84 (0.80, 0.89)***
1966–1975		1 (reference)
Spouses' relative education		
Wife has same		1 (reference)
Husband has more		1.06 (1.02, 1.10)**
Wife has more		1.00 (0.95, 1.05)
Both uneducated		1.24 (1.17, 1.31)***
Spousal age gap (years)		1.00 (0.94, 1.11)
Employment discrepancy		
Both working		1 (reference)
Only man working		1.02 (0.98, 1.07)
Only woman working		0.97 (0.77, 1.21)
Both not working		1.32 (1.08, 1.61)**
Polygyny		1.14 (1.09, 1.19)***
Decision-making indices		
Women alone (0–5)		0.97 (0.95, 0.99)*
Husband–wife (0–5)		0.93 (0.91, 0.96)***
Husband/partner alone (0–5)		1.04 (1.02, 1.06)**
Number of children		1.03 (1.02, 1.04)***
Early marriage		1.12 (1.08, 1.16)***

Table 4. Continued.

Variable	Empty Model[a]	Full model[b]
		OR (95% CI)
Level 2: Communities		
Rural (versus urban)		1.56 (1.47, 1.66)***
Median age of marriage		0.89 (0.88, 0.91)***
Average household size		1.08 (1.06, 1.10)***
Average spousal age gap		1.01 (1.00, 1.02)
Ratio of educated men to women		0.98 (0.96, 1.00)
Ratio of employed men to women		1.00 (1.00, 1.01)
Level 3: Countries		
GDI		
Low		1.62 (0.81, 3.23)
Medium		2.39 (1.16, 4.93)*
High		1 (reference)
Measures of variation		
Country level		
Variance (standard error)	0.695 (0.239)	0.337 (0.120)
Intra-class correlation (%)	14.0	7.9
Community level		
Variance (standard error)	0.989 (0.022)	0.665 (0.019)
Intra-class correlation (%)	19.9	15.5

GDI = Gender Development Index; OR = Odds Ratio; CI = Confidence Interval
*$p < .05$. **$p < .01$. ***$p < .001$.
[a]Empty model – null model; baseline model without any exposure variable.
[b]Full model – adjusted for individual, community and societal-level measures of gender inequality.

Measures of Associations (Fixed Effects)

The results of fitting the model including individual-, community-, and country-level gender inequality appear in Table 4 (full model). Birth cohorts had a statistically significant association with odds of justifying IPVAW. Older women were less likely to justify IPVAW than younger women (odds ratio [OR] = 0.66; 95% confidence interval [CI] 0.62 to 0.72). Women whose husband had higher education were more likely to justify IPVAW than women with the same level of education as their partner (OR = 1.06; 95% CI 1.02 to 1.10). Similarly, uneducated women with uneducated partners were more likely to justify IPVAW than women with some education and the same level of education as their partner (OR = 1.24; 95% CI 1.17 to 1.31). There was no association between spousal age gap and odds of justifying IPVAW. Compared to working women with working partners, unemployed women with unemployed partners were more likely to justify IPVAW (OR = 1.32; 95% CI 1.08 to 1.61). Women in polygamous families were 14% more likely to justify IPVAW

than women in monogamous families. Women who reported having the final say in most household decisions were 3% less likely to justify IPVAW.

Similarly, women reporting joint decision making with their partners were significantly less likely to justify IPVAW than women reporting individual decision making (OR = 0.93; 95% CI 0.91 to 0.96). Women were 4% more likely to justify IPVAW if their partner alone had the final say in more household decisions than they did. An increase in the number of children ever born increased the odds of justifying IPVAW by 3%. Women who married early (younger that 18 years of age) were 12% more likely to justify IPVAW than those who did not marry early.

Three significant community-level associations were identified. Women from rural areas were 56% more likely to justify IPVAW than their urban counterparts. Justification of IPVAW decreased as the median age of marriage increased above the community median age of marriage. An increase in the number of people living in a household above the community average household size was associated with an 8% increase in women justifying IPVAW. After controlling for the associations of individual- and community-level gender inequality, country-level gender inequality was statistically significantly associated with odds of justifying IPVAW. Women from countries with high GDI were 139% more likely to justify IPVAW (OR = 2.39; 95% CI 1.16 to 4.93) than those from countries with low GDI.

Discussion

This study is the first we are aware of that examines how proximate and distal gender inequalities are associated with women's attitudes toward IPVAW. We found that community and societal measures of gender inequalities were associated with women's acceptance of IPVAW independently of individual-level inequality. Our findings provide support for the growing body of research suggesting that contextual factors are important in explaining people's perceptions. The study adds to the literature by demonstrating that community and societal forms of gender inequality factors influence women's attitudes toward IPVAW beyond individual factors. We found that choices women make are important, but the community and society factors may also imposed willpower and restraints on women's attitudes to IPVAW. A few people believe that women's attitudes are of their own choosing; however, we found that women's attitudes may be depended on people around them and circumstances they found themselves in.

Our novel finding of geographical clustering in women's attitudes toward IPVAW had never been reported before. Women living in the same neighbourhood tended to have similar attitudes. This is in part because women in the same neighbourhood are subject to common contextual influences (Merlo et al. 2005) that express themselves as clustering of women's attitudes within the community.

The results of studies in sub-Saharan Africa (Abrahams et al. 2006; Choi and Ting 2008; Jewkes et al. 2003; Karamagi et al. 2006; McCloskey et al. 2005) and other parts of the world (Kim and Emery 2003; Palitto and O'Campo 2005; Straus et al. 1988; Yodanis 2004) have suggested that the risk of violence is higher in husband-dominated families than in egalitarian families. The reasons explaining why IPVAW continues to thrive in patriarchal societies and societies that encourage gender inequality may include the patriarchal structure of the most sub-Saharan African family, where society gives men considerable authority. (Haj-Yahia 2005; Straus 1980). Firstly, men are considered to have an advantage in resources and perceived as enjoying superior personal characteristics. They supposedly possess – exclusively – skills and abilities such as intelligence, wisdom, discretion, knowledge, professional prestige and the ability to make a living. Furthermore, men are expected to dominate women. Secondly, patriarchal societies tend to encourage socialization and education for compulsive masculinity. From a very young age, boys are educated to preserve their masculinity and are ashamed of behaviours that society perceives to be feminine or childish. Thirdly, women are subject to economic constraints and discrimination, which are usually imposed on them to a greater degree than on men, both within and outside the family. The repressive economic and occupational structure of patriarchal societies leaves women with very few alternatives. In general, the objective and perceived status of occupations and jobs open to women are inferior to those available to men. And, finally, the patriarchal, non-democratic and sexist structure poses a risk – or at

least a potential risk – of fostering a negative self-image among women. This threat to the woman's self-image can be attributed largely to society's emphasis on achievements and competitiveness, which are associated more with masculinity than femininity (Haj-Yahia 2005).

Study Strengths and Limitations

This large, population-based study with national coverage from 17 countries with high response rates makes several key contributions to the existing literature. The Demographic and Health Surveys have some important advantages when compared with other surveys. They are often nationally representative, allowing for conclusions that cover the entire nation. In addition, variables are operationalized in the same way, making it possible to compare numerical values across countries. Overall, the number of countries included, and their geographic and socioeconomic diversities, constitutes a good yardstick for the region and helps strengthen the findings from the study.

The findings of our study were based on a cross-sectional survey and, therefore. we were not able to determine whether the effects of neighbourhood characteristics on attitudes toward IPVAW were due to cumulated effects. Furthermore, neighborhoods used in the analyses were administrative boundaries, which may not adequately capture the social context important for individual attitude. However, this issue is not supported by the high neighborhood variances found.

Policy Implications

Given the societal and community factors that shape the attitudes of women toward IPVAW, we believe, like others (Harvey et al. 2007), that structural interventions hold great promise for significant achievements in the prevention of IPVAW. For nearly four decades, feminist researchers have argued that in order to stop men's use and women's experience of violence on the personal level, structures of gender inequality at the societal level must change (Brownmiller 1975; Dobash and Dobash 1979; Hester et al. 1996; Yodanis 2004). Multi-faceted interventions tackling structural determinants of IPVAW may represent a potentially effective approach for addressing issues related to IPVAW. Program components could include socio-economic development, promotion of higher education, youth development, media campaigns, educational interventions, male involvement initiatives and legislative reform efforts. A recent cluster randomized trial provides encouraging evidence that combined microfinance and training interventions can lead to reductions in levels of IPVAW in program participants (Pronyk et al. 2006). Structural interventions focusing on improving the coverage and dissemination of information to the general public may be beneficial in changing women's attitudes toward IPVAW, alongside a review of the educational system, which may seem to reinforce gender inequity (Uthman et al. 2009). Building on advocacy for shared autonomy in the domestic domain, and the provision of basic education for all, may prove paramount in changing women's distorted attitudes about IPVAW (Uthman et al. 2009). Interventions that promote joint decision making might be a promising strategy for increasing women's view toward equality while promoting men's views that household disputes should be settled with negotiation, not violence (Uthman et al. 2009).

Conclusion

We have provided evidence that community and societal forms of gender inequality factors may be associated with women's attitudes toward IPVAW beyond individual factors. Choices women make are important, but community and society factors may also imposed willpower and restraint on women's attitudes toward IPVAW. Thus, policies and programs aimed at reducing or eliminating IPVAW must address people, the communities and societies in which they live in order to be successful.

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Environmental Health Assessment of Primary Schools in Southeastern Nigeria: Implication for a Healthy School Environment in Developing Countries

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Abstract

In this cross-sectional descriptive study, we used a validated school health program evaluation scale (SHPE) to assess the environmental health status of primary schools in Ebonyi State, southeastern Nigeria. Parameters assessed included water supply, sewage and refuse disposal, school building ventilation, lighting and seating, as well as the availability of toilet tissue, basins for washing hands, regular cleaning of toilets, and so forth. Of all the schools assessed, only two schools, both private, attained the minimum acceptable SHPE score of 57. The mean SHPE score of the private schools (50.40) was significantly higher than that of the public schools (28.69) (t-test, p = .00). Policy reforms are needed that would ensure a healthy primary school environment in Nigeria and in other developing countries with similar settings.

Introduction

A healthy school environment has been defined as "the physical, emotional and social climate of the school designed to provide a safe physical plant, as well as a healthy and supportive environment that fosters learning" (Marx and Wooley 1998). Some studies have shown a clear link between environmental quality and educational performance (Kamarrudin et al. 2009; Murray et al. 2007). In Nigeria, the universal basic education (UBE) program was passed into law in 2004 as one of the strategies aimed at implementing the educational components of the Millennium Development Goals (Ejieh 2009). The UBE has thus enabled mass enrolment of children in schools, particularly public schools. However, schools ought to be adequately equipped with corresponding infrastructures to provide an enabling school environment for optimal learning for the child.

Earlier studies that assessed the state of the school environment in some parts of Nigeria noted that conditions were generally grossly suboptimal (Nwana 1988; Ofovwe and Ofili 2007). This situation is common in most rural and suburban schools in developing countries, particularly in Africa and Asia (Majra and Gur 2010). Findings such as these have policy implications and necessitate the institution of major reforms in the primary educational system. In most parts of Nigeria, as in other developing countries, such educational reforms are yet to be effected because of a dearth of baseline data on school environmental health assessments. In Ebonyi State, a relatively new state in southeastern Nigeria, no such study has yet been carried out. It is our aim to conduct environmental health assessments of primary schools within the Ebonyi State capital, with the view to highlighting the need for policy reform that would ensure a healthy school environment in Nigeria and in other developing countries with similar settings.

Materials and Method

This study was conducted in Abakaliki, the capital city of Ebonyi State, southeastern Nigeria, from January 2007 to June 2007 and involved 31 primary schools in the study area. Sixteen were run by the government (public schools), and 15 were privately owned. It was a cross-sectional descriptive study of all the primary schools within the study area, using a validated school health program evaluation scale (SHPE) (Akani 1997). The scale evaluates three aspects of the school health program: school health services, school health instruction and healthful school environment. The maximum score attainable from the scale was 66, and the minimum acceptable score was 57. Study approval was obtained from the Chairperson of the Ebonyi State Universal Basic Education Board for the public schools, and from the Chairperson of the National Association of Private School Proprietors, Ebonyi State chapter, for the private schools. Ethical clearance was obtained from the Ethics Committee of Ebonyi State University Teaching Hospital, Abakaliki, Nigeria. Data were analyzed using SPSS Version 13. Results from the public schools were compared with those of the private schools, using the independent sample t-test. Level of significance was set at a p-value of $< .05$ and the confidence level at 95%.

Results

Of the 31 primary schools assessed, the ratio of male to female pupils was 1:1.07. The mean ratio of teachers to pupils was 1:25 in the public schools and 1:20 in the private schools. None of the public schools had pipe-borne water, 56.3% had wells and 25% had access to bore holes, while the rest had no water supply at all. Of the private schools, 60% had pipe-borne water, while 33.3% had bore holes. All the private schools' source of water was within the school. For refuse disposal, the majority of schools (61.3%) practised open dumping, although this was significantly more common in public than in private schools ($p = .1$). No toilet was available in 56.3% of public schools, and their sewage disposal was the bush method. Pit latrines or toilets were used in 25% and 18.8% of public schools, respectively (Table 1). For the majority of schools with toilets, the ratio was one toilet to ninety pupils (1:90). In private schools, 73.3% had toilets, while the rest had pit latrines. In those with toilets, the ratio of toilets to students was 1:90, just as in the public schools. One school had a lower ratio: one toilet to 30 pupils.

Table 1. Distribution of types of sewage disposal in the private and public primary schools in Abakaliki southeastern Nigeria

	Sewage disposal method			
	Bush	Pit	Toilet	Total
Public schools				
Number	9	4	3	16
% within type of school	56.3%	25.0%	18.8%	100.0%
Private schools				
Number	0	4	11	15
% within type of school	0%	26.7%	73.3%	100.0%
Total				
Number	9	8	14	31
% within type of school	29.0%	25.8%	45.2%	100.0%

Among the public schools, 31.3% had dilapidated buildings, while none of the private schools' building were dilapidated. There was 100% sitting comfort (which means every pupil or teacher has a seat to him- or herself) in the private schools, but less for the public schools. A sports field was available in 87.5% of the public schools, but only 25% of the public schools had sports facilities. All the private schools had a sports field, and 80% of the private schools had sports facilities. The difference was statistically significant.

Toilet rolls and soap were not available in 87.5% of the public schools, whereas a majority of the private schools provided these toiletries ($p < .05$). Toilets were cleaned regularly in 87.7% of the private schools and in 31.3% of the public schools ($p = .002$). None of the public schools had a safety patrol team or a fire extinguisher, whereas 80% of the private schools had a safety patrol team and 26.7% had a fire extinguisher ($p = .00$). Compulsory wearing of shoes was noted in all the private schools but only in 62.5% of the public schools ($p = .00$). Only two schools scored above 57 on the SHPE, and those were private. Comparison of the mean scores of the public (28.69) and the private schools (50.40) using the independent t-test showed a significant difference ($p = .00$) (Table 2).

Table 2. A comparison of the mean school health programme evaluation scale scores in public and private primary schools in Abakaliki southeastern Nigeria

	Number	Mean	SD	SEM
HSE total score				
Public schools	16	28.69	5.606	1.402
Private schools	15	50.40	7.079	1.828

HSE = healthful school environment; SD = standard deviation; SEM = standard error of the mean.

Discussion

The situation analysis in the present study shows a deplorable state of the school environment, and it was worse in the public schools. None of the public schools had a water source within the school,

and a majority had no adequate means of sewage disposal. In contrast, most of the private schools got their water from taps or bore holes, and their means of sewage disposal were predominantly toilets. Our analysis found that most of the schools with toilets had just one for to up to ninety pupils. This constitutes an over-use of the sanitary facilities and a strain on maintenance. Although the guidelines for establishing schools in various states in Nigeria specify a ratio of one toilet to ten pupils, they seem to exist only on paper (Adia 2010). This is a common occurrence in most parts of Nigeria (Ekpo et al. 2008, Ogaji 2006) and is similar in many parts of the developing world (Majra and Gur 2010). Water, toilet tissue, soap and basins for washing hands are necessities for basic sanitation. It appeared that most of the private schools had obtained these items through contributions from pupils or through school fees. Thus, inadequate government funding of contributes to poor health in public schools and constitutes a major policy issue that should be considered an interventional priority.

Open dumping of refuse, found commonly in most of the schools studied, constitutes environmental pollution. These poor environmental sanitation indices do not seem peculiar to this study area. Other authors who surveyed environmental health knowledge and practice in different schools found similarly poor school environmental sanitation, despite sound knowledge of what constitutes ideal sanitation behaviour (Ebong 1994). Suffice it to note that environmental sanitation is a key element of the Millennium Development Goals under the theme "Ensuring Environmental Sustainability" by 2015. It has been reported that less than 50% of the Nigerian people have access to minimum national acceptable standard of sanitation, and in some states the number is as low as 10%, worse still in some rural settings (Oluyole 2010). Most childhood diseases can be traced back to lack of access to basic sanitation facilities.

As for the school buildings, none of the private schools were dilapidated, whereas 31.3% of the public schools were. This finding did not correlate with the age of the school. Dilapidated buildings put pupils at risk, as such buildings may collapse. In addition, it has been documented that with poor conditions of school buildings, students could be expected to reflect the negative environment in poor academic performance (Kamaruddin et al. 2009). Another area of contrast was seating. All the private schools had 100% comfortable seating for pupils and teachers, while the converse was the case for the public schools. Although the conditions at the middle and high school level in Nigeria are relatively better than those in primary schools, they are still far from optimal.

It is recommended that the governments of developing countries consider implementing policy reforms that would ensure a healthy primary school environment. In conclusion, school age children in the developing world deserve good health in all aspects. To achieve this, and to meet the MDGs of improving child health and environmental sustainability, the concerted efforts of both public and private sectors are imperative.

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Mortality, Nutrition and Health in Lofa County Liberia Five Years Post-Conflict

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Abstract

Liberia remains in transition from a state of humanitarian emergency to development, and Lofa County was the epicentre of recent conflict. This study aimed to estimate mortality and malnutrition and evaluate access to health services, water and sanitation. The survey was conducted in April 2009 and employed a 46 cluster × 20 design (n = 920 households) with probability proportional to size sampling. The crude mortality rate was 24.3/1000/year (CI: 19.0 to 29.6) or 0.67/10,000/day (CI: 0.52 to 0.81). The global acute malnutrition rate was 7.9% (CI: 5.4 to 8.9), and the severe acute malnutrition rate was 4.5% (CI: 2.9 to 6.7). Access to basic health services was relatively good according to a variety of indicators; however, access to sanitation was low, with 39.5% of households reporting access to toilets or latrines. Despite high rates of displacement and infrastructure destruction, population health appears to be relatively stable five years post-conflict, though a continued focus on reconstruction and development is needed.

Introduction

Liberia remains in transition from a state of humanitarian emergency to development. After suffering 14 years of civil war (1989–2003), Liberians are still recovering from the systematic violence and atrocities that were commonplace. From Liberia's pre-war population of approximately 2.8 million, an estimated 200,000 to 300,000 people were killed, around 800,000 fled the country and 1.1 million became internally displaced (Williams 2002). The health system was left in ruins; an estimated 95% of health facilities were destroyed in the conflict, and from an initial level of 400 trained government doctors, fewer than 20 remained by the end of the war in 2003 (United Nations Development Program [UNDP] 2006). The epicentre of conflict between 1999 and 2003 was Lofa County, which is located in Northwestern Liberia, bordering Guinea and Sierra Leone. Lofa County experienced almost total destruction of basic infrastructure during the war.

Although resettlement and return to Lofa County have increased in recent years, health service availability has remained relatively constant. Health services for the growing population are insufficient and a major concern. In 2006, Lofa County's estimated population was 276,347; however, that number is in flux because of post-conflict reintegration and migration. At present, facility-level health statistics reflect only the health status of the population seeking care, and a lack of population-level health data inhibits health policy and program decision making (Blanton 2008). We undertook this study to describe basic demographic indicators for the Lofa County population, child nutrition status and measures of health access in Lofa County, and to provide information to support policies and programs that address the returning population's health needs. Mortality and nutrition were the primary focus of the assessment because the basic indicators for assessing the severity of a crisis are the death rate and the nutritional status of the population (SMART 2005).

Methods

We used the Standardized Monitoring and Assessment for Relief and Transition (SMART) Methodology as a basis for the survey design because it is considered best practice for assessing mortality and nutrition in emergency-affected populations. It incorporates sample size and study design considerations that are relevant for emergency-affected populations (The SMART Initiative 2005). Sample size calculations assumed 80% power (1-β), significance level of $\alpha = 0.05$ and a design effect of 1.5 (Kaiser 2006). National crude mortality rate estimates (12 deaths/1000/year in 2007) are below the emergency threshold of 1.0 death/10,000/day. However, the crude mortality in Lofa County was anticipated to exceed the national rate. It was the epicentre of recent conflict that resulted in higher levels of displacement and infrastructure destruction than in other areas (US Census Bureau International Database 2008; Centers for Disease Control and Prevention 1992; The Sphere Project 2004). Mortality sample size calculations were based on a conservative average household size of 5.0 and a hypothesized death rate of 0.5/10,000/day or 18 deaths/1000/year (precision level of 0.3/10,000/day, 90-day recall period). This yielded a minimum sample size of 492 households, which was increased to 708 households based on a hypothesized design effect of 1.5. For the nutrition component, sample size calculations were based on the detection of a ≥3% difference between the global acute malnutrition rate for Lofa County and the national prevalence rate of 8% (Liberia Institute of Statistics and Geo-Information Services [LISGIS] 2008). This yielded a minimum sample size of 1054 children 6 to 59 months of age. Children under 5 years of age constitute approximately 19.6% of the rural Liberian population. The average household size in Lofa County is 5.9, yielding a target sample of 911 households (Tomczyk 2007; LISGIS 2008). The planned sample targeted 920 households, including an estimated 5,520 individuals and 1,100 children under five years of age.

A 46 cluster × 20 household design was identified because it allowed for better geographic coverage and a potentially lower design effect than the standard 30 × 30 cluster EPI-based design. The 46 clusters were allocated at the district level within Lofa County using probability proportional to size methods based on the 2008 Liberian census data (Government of Liberia [GOL] 2008). A similar process was used to select communities within each district using place codes (p-codes) for

Lofa County settlements, which is the only available post-war population estimate (Humanitarian Information Centre [HIC] 2005). Once a community was selected, the centre was identified and a random direction was chosen. The residences along the transect from the central start point and the community edge were counted, and one house was randomly selected as the starting point for the cluster. From this house, the nearest residence was selected until the cluster of 20 households was completed; if the residents of the nearest house were not in the vicinity, the next house was visited.

Once a household was identified, the survey was described to an adult household member, preferably the primary caretaker of the children or the household head. If this individual consented, the interview and anthropometric assessment for children followed. Household members were defined as people who had slept in the dwelling most nights during the past month, including those with no biological relation. All children between six and 59 months who were physically at the home or in the vicinity of the home at the time of the interview were included in the anthropometric assessment. Interviews took place during daylight hours; in some cases, more than one village was visited by a survey team during a day, so the timing of household visits varied.

Interviewers received three days of training on interview techniques and anthropometric assessment prior to the survey. The questionnaire focused on demographics. However, additional questions on access and use of health services and water and sanitation were included with the aim of informing future program planning. The hybrid household census method was used to account for both in- and out-migration, with a 1-year recall period for changes in household composition, including mortality and the reported cause of death. The questionnaire was developed in English. Following the pilot test, a local seasonal calendar was developed to aid in estimating unknown dates and ages. Interviews ranged from 15 to 30 minutes in length; when required the questionnaire was translated orally into local languages including Lorma, Mandingo, Kissi and Kpelleh (Blanton 2008).

Standard anthropometric assessment methods were applied (Cogill 2003). If the age of a child was not known and could not be approximated using a seasonal calendar, height was used as a criterion for inclusion. Children with unknown ages who were less than 100 cm in height were included in the assessment and presumed to be less than five years of age. Recumbent length was measured on children less than two years of age (or those less than 80 cm in height if age was unknown) and older children were measured while standing; length/height was measured to the nearest 0.1 cm. Weight was measured to the nearest 0.1 kg using Salter scales (hanging infant scales) for children of all ages because only bathroom scales were available for older children and were not considered sufficiently accurate. Edema was assessed by applying pressure on the top of the child's foot for two seconds; children were classified as having edema only if it was observed in both feet. Mid–upper arm circumference (MUAC) was measured for rapid screening, and if a child was identified as malnourished by MUAC (<12.5 cm) he or she was referred to a health centre for treatment.

Data entry was completed in Microsoft Excel, and 10% of all questionnaires were randomly checked to ensure acceptable levels of accuracy and quality. Forms were deemed accurate if they were completely filled out and household size was consistently reported. Data analysis was conducted primarily in SPSS. Anthropometric data was analyzed using Anthro Version 3, which incorporates the new World Health Organization (WHO) international reference population. Nutrition data were analyzed using both the new WHO international reference population and the National Center for Health Statistics (NCHS) reference population for comparative purposes (WHO 2009). Plausibility checks were run on the anthropometric data, and extreme values (beyond +/– 5 or 6 SD, depending on the parameter) were excluded when prevalence rates were calculated. Confidence intervals were adjusted to account for the design effect associated with cluster sampling. A child was categorized as stunted, underweight or wasted if he or she fell below –2 z-scores when compared to an age and sex-specific reference population; severe stunting, underweight and wasting was defined as below –3 z-scores when compared to the reference population. Demographic rates for the year preceding the survey (April 2008 to April 2009) were calculated using standard demographic methods with a mid-interval population as the rate denominator. Cluster-level analysis was used to obtain the mortality rate to ensure confidence intervals were appropriate given the cluster design.

The study was reviewed and approved by the Institutional Review Board at Johns Hopkins School of Public Health and the Liberian Ministry of Health and Social Welfare.

Results

The survey was conducted in April 2009. To obtain the target sample size of 920 households, 922 households were invited to participate in the survey, yielding a refusal rate of 0.2%. Basic demographic characteristics of the sample population (n = 6055 current household members) are presented in Table 1. The population was young, with 36.8% falling in the 0 to 9 year age group and 19.1% in the 10 to 19 year age group. Of households surveyed, 91.4% reported having left Lofa County during the conflict. Urban populations had a higher displacement rate at 96.9%, compared with 90.7% among the rural population (p = .007); displacement rates also varied significantly by district, as illustrated in Table 1.

Table 1. Study population characteristics

Indicator	Point estimate
Average household size	6.6 (SD = 2.9)
Males Females	46.4% 53.3%
Average age	21 (SD = 19)
Displacement rate Foya District Vahun District Salayea District Quadu Gboni District Kolahun District Zoror District	91.4% 98.8% 98.3% 96.2% 93.8% 82.5% 82.1%

Nutrition

A total of 1,178 children six to 59 months of age were reported as current household members, and 931 (79.0%) participated in the anthropometric assessment. Of children who did not participate, the majority were not in the house or immediate community when the survey was conducted. Prevalence of stunting, underweight and wasting by age are summarized in Table 2 for both the NCHS and WHO reference populations. NCHS data are presented to better allow for comparison of findings with historic data; however, subsequent analysis and discussion is based on the newer WHO standards. Prevalence of moderate and severe malnutrition rates for stunting, underweight and wasting were similar by sex. The prevalence of stunting, which increased with age, was 31.3% (CI: 27.0 to 35.9), and the prevalence of severe stunting was 14.3% (CI: 11.6 to 17.5). Overall, the prevalence of underweight was 13.3% (CI: 10.3 to 17.0) and the prevalence of severe underweight was 5.4% (CI: 3.9 to 7.6); underweight prevalence was highest among younger children. The prevalence of wasting, which decreased with age, was 6.8% (CI: 4.7 to 9.7) and severe wasting 3.5% (CI: 2.3 to 7.5). A total of 10 children were found to have edema, yielding an edema prevalence rate of 1.1% (CI: 0.5 to 1.9).

The rate of global acute malnutrition (GAM), which includes children falling below –2 z-scores on the weight-for-height distribution and children with edema, was 7.9% (CI: 5.4 to 8.9). The severe acute malnutrition (SAM) rate, which includes children falling below –3 z-scores on the weight-for-height distribution and those with edema, was 4.5% (CI: 2.9 to 6.7) The GAM and SAM rates presented were determined using the WHO reference population.

Table 2. Prevalence of malnutrition by age group

	Reference population			
	WHO (%, 95 CI)		NCHS (%, 95 CI)	
Prevalence of stunting				
6–11 months (*n* = 111)	12.6	7.1–21.5	9.6	5.3–17.0
12–23 months (*n* = 215)	26.5	19.6–34.8	23.7	17.1–31.9
24–35 months (*n* = 201)	36.8	31.4–42.6	27.6	22.7–33.0
36–47 months (*n* = 169)	33.7	25.2–43.5	28.4	21.1–37.1
48–59 months (*n* = 158)	41.1	32.0–50.9	39.2	30.3–48.9
TOTAL (*n* = 854)	31.3	27.0–35.9	26.5	22.5–31.0
Prevalence of underweight				
6–11 months (*n* = 113)	15.0	7.9–26.9	15.0	8.2–26.1
12–23 months (*n* = 222)	13.1	8.2–20.2	19.4	13.7–26.6
24–35 months (*n* = 208)	16.8	11.7–23.5	20.1	14.4–27.3
36–47 months (*n* = 175)	10.3	6.5–15.9	10.3	6.5–15.9
48–59 months (*n* = 163)	10.4	5.9–17.8	13.5	7.8–22.4
TOTAL (*n* = 882)	13.3	10.3–17.0	16.2	12.5–20.7
Prevalence of wasting				
6–11 months (*n* = 107)	13.1	6.6–24.3	11.2	5.3–22.1
12–23 months (*n* = 210)	7.6	4.4–12.9	8.6	5.2–13.9
24–35 months (*n* = 197)	8.1	4.8–13.5	7.5	4.4–12.6
36–47 months (*n* = 165)	3.6	1.5–8.5	3.0	1.3–6.7
48–59 months (*n* = 154)	0.6	0.1–4.8	0.6	0.1–4.8
TOTAL (*n* = 859)	6.8	4.7–9.7	6.7	4.7–9.4

Vital Events

A total of 286 births were reported in the year preceding the survey, which translates to a crude birth rate of 46.1/1,000/year. In the 12 months preceding the survey, 147 deaths were reported, resulting in a crude mortality rate of 24.3/1,000/year (CI: 19.0 to 29.6) or 0.67/10,000/day (CI: 0.52 to 0.81). No significant difference in the mortality rate was observed by sex, district or urban/rural location. Mortality rates between the wet and dry seasons were relatively similar; however, a seasonal trend was observed (Figure 1). The leading causes of death, as reported by surviving household members, were malaria, old age, maternal deaths and diarrhea (Figure 2).

Health Services

Households reported seeking health services an average of 3.5 times (median = 3.0) within the past six months, with only 13.7% of households reporting that they did not seek medical care when they needed it. When asked about the last time a household member sought care, the majority of house-

Figure 1. Deaths reported by month in the year preceding the survey

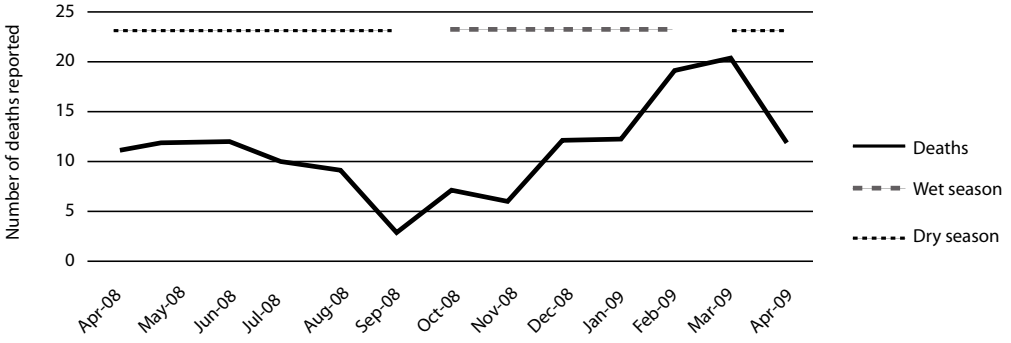
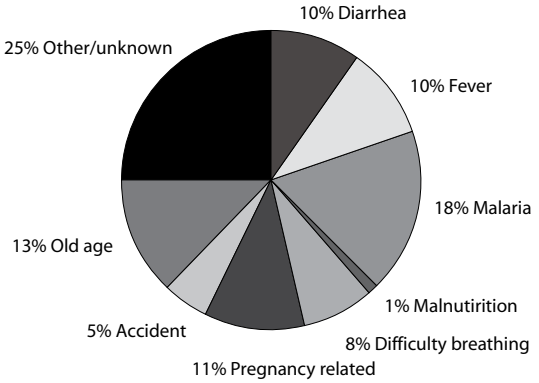


Figure 2. Causes of mortality



holds (71.7%) reported seeking care at a health clinic or centre; other locations included hospitals (12.7%), community health workers (5.1%), private clinics (4.0%), health posts (3.2%), pharmacies (2.3%), mobile medication vendors (0.6%) and private providers (0.4%). Time travelled to seek care varied greatly, with travel times of up to a day (travel during daylight hours). Mean and median travel times were 115 minutes and 45 minutes, respectively; significant differences were observed by district and between urban and rural areas ($p < .001$ for both comparisons). When asked about payment for health services at the household's last care-seeking visit, 80% of households reported services were received free of charge. The proportion of households reporting an out-of-pocket payment varied significantly by district ($p < .001$) but was similar between urban and rural populations ($p = .543$). Among the 20% reporting out-of-pocket expenses, the average payment was 380 Liberian dollars (LRD), or 5.61 US dollars; payments ranged from 0 to 3000 LRD (0 to 44.40 US dollars), with a median value of 200 LRD (2.96 US dollars). Payment amount[1] differed significantly by urban and rural residence location ($p = .045$) and by district ($p < .001$) (Table 3).

As would be anticipated, payment frequency and amount varied greatly by provider. The vast majority of households reported most recently seeking care at a health centre or clinic. Of these, 11% reported out-of-pocket expenditures; the mean expenditure among this group was 217 LRD (3.21 US dollars), and the median expenditure was 100 LRD (1.46 US dollars). Hospitals and community health workers were the next most common sources of care, accounting for 13% and 5% of visits, respectively. The average payment at hospitals was considerably higher than that charged by other providers, at 825 LRD (12.21 US dollars), with a median payment of 550 LRD (8.14 US dollars), presumably because more complex cases presented at these facilities. Among those who sought care from community health workers, the average payment was 128 LRD (1.89 US dollars),

with a median payment of 100 LRD (1.46 US dollars). Fewer households reported seeking care at private clinics or providers, pharmacies and mobile medication vendors; the requirement for payment among these sources of care was substantially higher and was reported in 80% to 100% of visits. Mean and median payments to private clinics, pharmacies and mobile medication vendors were greater than payments to health clinics and community health workers, though less than the average payment reported by care seekers at hospitals.

Table 3. Travel time, payments and satisfaction at health facilities by district

	Travel time (minutes)		Payments (LRD)			
	Mean	Median	% paying (*n*)	Mean[a]	Median[a]	Satisfaction with services (%)
Foya	72	60	25 (60)	187	50	79.7
Kolahun	78	60	4 (7)	70	70	83.8
Salayea	33	5	5 (4)	869	650	89.6
Vahun	105	120	2 (1)	20	20	71.2
Voinjama	29	60	37 (15)	483	315	76.1
Zorzor	131	25	54 (77)	529	350	69.6
Quadu Gboni	86			298	275	79.5
Urban areas Rural areas	33 83	60 30	20 (33) 22 (149)	532 346	350 200	79.4 75.2
Total	115	45	20 (182)	380	200	78.7

[a] Among households reporting any payment only.

Overall, 78.7% of households reported being satisfied with services they received at their last visit. Satisfaction levels varied significantly by district of residence ($p = .009$) and provider type ($p < .001$) but were statistically similar between urban and rural populations ($p = .477$). Among the 78.7% of households that reported being satisfied with the services they received, the primary reason for satisfaction was the quality of services or doctor (39.5%), followed by the quality of medication (34.6%), the availability of medication (19.0%) and other reasons (6.9%). The 19.9% of households that indicated they were unhappy or dissatisfied with the services they received reported a greater variety of responses. The primary complaints concerned the availability and cost of medication, cost of services, wait time and distance. A total of 13.7% of households reported one or more instances where they had needed but not sought medical care in the 6 months preceding the survey. The primary reasons reported for not seeking care included distance (30.3%), that the illness was not serious enough (23.2%), a dislike of available services or service quality (15.2%), cost (10.1%), transportation difficulties (7.1%), limited medication availability at health facilities (6.1%) and that it was not a household priority (5.1%).

Water and Sanitation

The primary water source was hand pumps, which were used by 68% of households; also common were open wells without pumps (11%) and unimproved water sources (21%). Two out of three households reported that it took less than five minutes to reach their primary water source, and only 4% reported travelling 30 minutes or more. In urban areas, 76% of households reported efforts

to improve water quality, including 70% that treated drinking water with chlorine or bleach. In contrast, 55% of rural households reported water quality improvement activities, including 38% that treated water with chlorine or bleach ($p < .001$ for both comparisons). Household water use averaged 7.5 L/person/day (median = 6.0 L/person/day) in the dry season and 8.4 L/person/day (median = 6.7 L/person/day) in the wet season. However, perceived access to water varied significantly between the wet and dry season, with 31% and 84% of households, respectively, reporting adequate access to water in each season. The lowest levels of water consumption were observed in Salayea, where median water consumption (at home) in both the dry and wet seasons was 5 L/person/day; only 10% of Salayea households reported adequate access to water in the dry season.

In total, 39.5% of households reported having access to improved sanitation, with 27.9% having a shared latrine, 11.1% a private latrine and 0.4% indoor flush toilets. Access to latrines in urban areas (70%) was significantly greater than in rural areas (33%) ($p < .001$). When asked about defecation location, 65.1% of households defecated outside (not in latrine) almost always, with only 22.2% reporting they always used a toilet or latrine.

Discussion

In general, the nutrition status of children in Lofa County was favourable in comparison with recent national figures – a positive finding considering the massive displacement and disruption that occurred in Lofa County. It is also possible that nutrition status has improved nationally among the population over the post-conflict and post-displacement time period. The observed stunting prevalence of 31.3% compares to a national stunting rate of 39.4% and a rate of 44.5% for North Central Liberia, which includes Lofa County, as reported by the 2007 Liberian Demographic Health Survey (DHS) (LISGIS, 2008). The observed underweight prevalence of 13.3% compares to a national prevalence of 19.2% and a rate of 20.0% in North Central Liberia. Wasting prevalence, at 6.8%, compares with a national prevalence of 7.5% and a prevalence of 6.5% in North Central Liberia (LISGIS 2008). Our findings and the DHS findings are similar in their mean z-score by age group for wasting, which are both only negative among children in the 6- to 11-month age range. These data and the comparatively high rates of moderate and severe acute malnutrition found in children aged six to 35 months suggest weaning is an especially problematic period. Education for caregivers and nutrition counselling during ante- and post-natal care, coupled with community-based nutrition programs, would be beneficial, contributing to immediate reductions in wasting and to improved future growth.

The observed crude birth rate of 46.1/1,000/year in Lofa county compares to national crude birth rates of 37.4/1,000/year as estimated in the Liberian DHS and 43/1,000/year as estimated by the US Census Bureau (LISGIS 2008; US Census Bureau 2008). The Liberian DHS estimated the total fertility rate at 6.0 in North Central Liberia (including Lofa County), compared to a national total fertility rate of 5.2, suggesting that the crude birth rate in Lofa County would be anticipated to exceed the national average. There were a total of 1,526 women of reproductive age (15 to 49 years) at the time of the survey, suggesting that approximately 18.7% of women of reproductive age give birth each year. Preliminary results from the 2008 Liberian census indicate the population of Lofa County was 270,114 in early 2008 (GOL 2008). When the crude birth rate is applied, this translates to an estimated 12,776 births per year in Lofa County, although the actual figure is likely higher as a result of increases in population size from returning individuals.

The observed crude mortality rate of 24.3/1,000/year or 0.67/1,000/day falls well below the emergency threshold of 1/10,000/day and was slightly above recent national morality estimates of 21/1,000/year. This suggests that mortality rates in Lofa County may be similar or elevated when compared with other areas of Liberia (LISGIS 2008; US Census Bureau 2009). Malaria was reported as the leading cause of death among the entire population, accounting for 16% of deaths; old age, maternal deaths and diarrhea were other commonly reported causes of death. Malaria is endemic in Liberia, with year round transmission in most parts of the country (Mapping Malaria Risk in Africa 2002). While mortality rates in the dry and wet seasons were statistically similar, a clear trend in seasonal mortality was observed (Figure 1). Few published studies are available on mortality

patterns in Liberia, and no data are available for populations that have returned and resettled in rural communities following the civil war (Ahmad 1991; Becker 1993; Doocy 2004). However, seasonal mortality patterns observed in Lofa County are similar to patterns in rural Burkina Faso, where malaria is also endemic. In Burkina Faso, lower mortality rates were observed from June to October and higher rates from November to May; peak mortality occurred early in the dry season, and for young children, excess mortality was greatest at the end of the rainy season and was attributed to malaria deaths (Knyast-Wolf 2006). Reduced access to health services in the rainy season, resulting from impassable roads, is a common problem in Liberia and is also a potential contributor to increased mortality during the rainy season (Allen 2009).

Morbidity and mortality surveillance data for 2008 from 14 Lofa County clinics were analyzed to compare causes of death reported in the survey with deaths among clinic patients. The clinics were run by the International Medical Corps (IMC); data was available for 65,800 visits and 31 deaths. Among care seekers at the IMC clinics, primary causes of death included diarrhea (29%), malaria (23%) and anemia (13%). No deaths due to old age or related to pregnancy were reported at IMC clinics, in contrast to the population-based survey data where these categories together accounted for 24% of reported deaths. Many deaths, if not a majority, occur in communities in less-developed settings such as Lofa County. It is especially likely that deaths from old age would be under-reported at health facilities because they would likely occur in the community, with no attempt to seek care. Emergency obstetric cases and trauma-related deaths are also likely to be under-reported at primary care facilities because if care was sought, it would likely be at a referral facility with greater capacity to provide emergency services. Despite relatively good access to basic health services, a substantial number of pregnancy-related deaths were reported, suggesting that more should be done to improve access to quality maternal health services, including increased availability of skilled attendants at birth (De Bernis 2003; Kwast 1996).

Children under five accounted for 15% of deaths. It is possible that this proportion is an underestimate, either because of differential reporting by age group, or as a result of under-reporting of infant deaths. Among children, malaria was reported as the cause of mortality in 44% of deaths, followed by fever (22%), which may have resulted from malaria. Among children under five at IMC clinics, malaria was also the primary cause of death, accounting for seven of 17 (41%) of child deaths; other reported causes included diarrhea (n = 4; 24%), anemia (n = 3; 18%), malnutrition (n = 1; 6%) and others (n = 2; 12%). The high proportion of malaria-related mortality suggests that additional malaria prevention and treatment efforts would substantially benefit the population.

That over 90% of households indicated it took less than 15 minutes to reach their primary water source is a relatively positive finding, considering the rural nature of Lofa County. Residents of Voinjama district appeared to travel the longest times to fetch water, which is somewhat surprising considering that the city of Voinjama is the capital of Lofa County. Household access to adequate sanitation was exceptionally low, a minority of households (39.5%) reporting access to toilets or latrines. Diarrhea was second most commonly reported infectious cause of death, accounting for 11.9% of deaths. Access to hand pumps (a protected water source) was relatively high at 67%, and a similar proportion (68%) of households reported treating their drinking water, both of which would contribute to a lower incidence of diarrhea. Better access to sanitation would be of substantial benefit to the population of Lofa County. That 60% of households have no access to a latrine or toilet is a major public health concern. Improved access to basic sanitation is clearly needed throughout Lofa County. Basic sanitation programs such as latrine construction should be a priority, particularly in rural areas where only one third of households had any latrine access and where less than one in ten families had access to a private latrine.

Limitations

A major challenge was developing representative sampling frames in the absence of recent population data. While recent census data was available at the district level, community-level information was several years old and had not been updated to reflect the return of displaced populations. This

could have resulted in sampling bias if there were differential returns among communities in the same district. Another concern was the number of languages within Lofa County and oral questionnaire translation. Common local languages were identified for each community that was sampled, and interviewers with appropriate language skills were subsequently selected. No apparent issues in oral translation were observed; however, it is possible that translation issues may have contributed to increased reporting errors. Cause of death was reported by surviving household members. This may also have contributed to misreporting, especially in cases where deaths occurred without medical attention and no diagnosis was reported. Consequently, data on cause of death should be interpreted with caution.

Another challenge was obtaining accurate ages for children in the anthropometric assessment. Most caretakers appeared able to accurately report their child's age; however, this was impossible to verify without birth certificates. A local calendar including holidays, sentinel events and growing season was used to improve reporting quality, although it is possible that some dates were reported inaccurately. Anthropometric data was not gathered for 21% of children between six to 59 months of age because they were not at home at the time of the assessment. Because of the difficulties in reaching many communities, some of which were several hours' walk from the main road, it was impossible to wait for children to return or to revisit households. This may have resulted in bias if these children were different from those who participated in the assessment, and could have resulted in under- or overestimation of malnutrition. Feeding programs were not ongoing at the time of the assessment, eliminating the possibility that the children differed in terms of benefiting from food distribution. Variation in household food production or income generation activities is a potential source of bias that was not accounted for in the survey. Lastly, if the type of illness and/or services sought at the most recent health facility visit had been collected, a more in-depth analysis of health expenditures by facility type and health condition would have been possible.

Conclusions

The study aimed to provide current mortality and nutrition data on the population in Lofa County, Liberia, and to inform health programming provided by both the government and international nonprofit organizations. Existing population-based health and demographic data for Lofa County was gathered prior to the conflict and to the return of the displaced population, which peaked from 2004 to 2006. Other data sources, such as facility-based data and national surveys, are either unrepresentative of the Lofa County population as whole or do not have information specific to Lofa County. Data from the current assessment is important for comparing Lofa County with national figures for Liberia. It is also important as a baseline from which gains in health, demographic and development indicators such as access to water and sanitation can be measured as reconstruction efforts continue. The nutrition status of children Lofa County was comparable to national figures from the 2007 DHS, a positive finding considering that Lofa County was the epicentre of the civil war. Mass population displacement, estimated at 91%, coupled with destruction of basic infrastructure and the remote landscape are all factors that suggest health statistics for Lofa County would be worse than national averages. However, study findings indicate that population health in Lofa County, as measured by the crude mortality and child malnutrition rates, is comparable to other areas of Liberia. Despite high rates of displacement and infrastructure destruction, population health appears to be relatively stable five years after the conflict, though clearly a continued investment in reconstruction and development is needed.

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Endnotes

[1] Liberian dollars were converted to US dollars using an exchange rate of 1 US dollar equals approximately 67.575 LRD.

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Evaluation of a School-Based Intervention to Reduce Traffic-Related Injuries among Adolescents in Beijing

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Abstract

Objective: Millions of adolescents are killed or injured in traffic accidents on the world's roads each year, but data on traffic-injury prevention programs targeting adolescents are limited, especially from developing countries. The aim of the study was to evaluate the effectiveness of a traffic-injury prevention program targeting adolescents in China.

Methods: We conducted a school-based traffic-safety intervention program with 2,759 students in two middle schools and two high schools in Beijing. An open-cohort, pre–post design with intervention and control groups was used to evaluate the intervention effect.

Results: Compared with the control group, the intervention group reported a significant increase in knowledge and awareness of traffic safety and a decrease in self-reported unsafe traffic behaviours.

Students in middle school and girls reported better intervention effects than their high school and male counterparts.

Conclusion: This study suggests that school-based traffic-injury prevention programs may increase participants' knowledge of traffic signs and awareness of traffic safety issues. The high traffic mortality in China, particularly in Chinese adolescents, suggests that more age- and culture-appropriate traffic safety promotion programs are needed.

Introduction

Each year, 1.2 million people are killed in traffic accidents worldwide (Peden et al. 2004). According to the World Health Organization (WHO), road traffic accidents constituted the ninth most frequent cause of death in 2004 and will rise to fourth by 2030 (WHO 2008). Almost half of traffic-related deaths are in "vulnerable road users" (i.e., pedestrians, cyclists or motorcyclists). Among these populations, children and adolescents are more vulnerable than adults. Traffic accidents are the second leading cause of death for children aged five to 15 years, and the number one killer for adolescents and adults aged 15 to 29 years (WHO 2008).

Despite the high rates of traffic-related mortality and morbidity in vulnerable road users, especially in children and adolescents, few studies evaluate interventions to improve road traffic safety among this younger group. Traffic safety interventions targeting adolescents focused mainly on reducing teenagers' risky driving habits (Duperrex et al. 2002). Reports on a small number of interventions on adolescent vulnerable road users showed positive effects of school-based interventions. For example, Hotz et al. (2004) reported that a school-based pedestrian-safety intervention program had improved knowledge of traffic safety and increased observable safe traffic behaviours among school children. Martinez et al. (1993) reported a school-based education outreach program in the United States (US) that had helped students identify traffic hazards, resulting in decreased self-reported unsafe traffic behaviours. However, all these studies have been conducted in developed countries, and there is a lack of evaluation studies on interventions to reduce traffic injuries in developing countries, particularly interventions targeting adolescent vulnerable road users. Furthermore, studies on traffic-related injuries in developing countries are mainly descriptive, with few interventions (Cai et al. 2008; Jing et al. 2008).

China hosts less than 2% of vehicles worldwide but accounts for 15% of traffic-related deaths (Li 2005). Over the past 50 years, road traffic accidents in China have increased by a factor of 68, from 6,000 in 1951 to 413,000 in 1999 (Wang et al. 2003). Vulnerable road users suffered more than half of traffic-related deaths; 26% were pedestrians, 9% cyclists and 28% motorcyclists (Wang et al. 2003; WHO 2009). Road traffic injury has become a leading cause of death for people aged one to 44 years and the leading cause of death for children under 14 years (China Ministry of Health 2000; Safe Kids Worldwide 2009). From 2000 to 2004, pedestrians and cyclists incurred 88.3% of morbidity and mortality caused by traffic accidents (Thein and Lee 1993). Some studies have indicated that the injury rate among males is higher than among females (Li and Baker 1997). However, few have examined the gender difference in traffic-related behavioural interventions.

Economic growth has accounts for an increasing number of motor vehicles in China over the past two decades. Provinces and areas in China have experienced different degrees of motorization. Beijing's grew more rapidly than any other. In 1990, the Beijing motorization index (vehicles per 1000 people) was 42.43, increasing to 111.28 in 1999 (Wang et al. 2003). With rapid motorization, road traffic mortality soars. In 1990, the mortality rate due to road traffic accidents in Beijing was 4.32 per 100,000; in 1999, it had increased to 11.95 per 100,000 (Wang et al. 2003).

In response to the skyrocketing number of traffic accidents, in 2003 the Chinese legislature passed the first road traffic safety laws, including speed limit, safe driving, and motorcycle helmet laws (Passmore and Ozanne-Smith 2006; WHO 2009). These laws had some effect, but it was limited by insufficient enforcement. The WHO reported that in 2006, the mortality rate from traffic accidents in China had decreased from nine deaths per 100,000 in 2001 to seven per 100,000 in 2006 (WHO 2009).

Despite the gloomy numbers, few interventions have been conducted to improve traffic safety behaviours among vulnerable road users in China, and there is a further paucity of studies evaluating interventions targeting adolescents. To fill this literature gap, in our study we evaluated a school-based intervention program targeting adolescents in Beijing. Our comprehensive program aimed to improve their knowledge and awareness of traffic safety.

Methods

Study Site

We conducted our study in Chaoyang District, Beijing. Beijing, the capital city of China, has experienced a dramatic increase in the number of motor vehicles as well as traffic accidents. The number of registered vehicles has increased from less than one million in 1997 to almost four million in 2009. More than 1900 new vehicles are registered every day in Beijing (Beijing Public Service Radio 2009; Kong 2005).

Chaoyang District is the largest and most populated in Beijing, with a population of more than three million, including two million permanent residents (people with Beijing household registration) and one million migrants (Chaoyang District Government 2007). We chose Chaoyang District as our study site because of its diverse population and variety of social classes.

Traffic injuries and deaths have become a major public health issue in Beijing. In 2006, there were 5,808 traffic accidents, with 1,373 deaths and 6,681 injuries due to these accidents. Direct costs of these accidents were more than 4 million Canadian dollars (China Statistical Yearbook 2007). Children and adolescents are disproportionately affected. A study conducted in Beijing showed that traffic injury was one of the three leading causes of death among adolescents 12 to 17 years old (Zeng 2006). The incident rate was 2.41% among 10- to 15-year-olds, and 1.96% among 15- to 17-year-olds. The majority of children and adolescents injured or killed in traffic accidents were vulnerable road users: 28.6% were pedestrians and 57.1%, cyclists (Zeng 2006). A study that analyzed accident locales revealed that 32% of traffic accidents involving elementary and middle school students in Beijing took place between the home and school (China Education News 2007).

Study Population and Study Design

The Institute of Health Education in the Beijing Center for Disease Control and Prevention (Beijing CDC) conducted the school-based intervention program. Of 83 middle schools and high schools in Chaoyang District, we randomly selected two middle schools and two high schools to participate. We randomly assigned one middle school and one high school to the intervention group and the others to the control group. As the schools were geographically dispersed, the chance of contamination was minimal. To reduce the burden on students, we randomly selected only a subset to complete the baseline and follow-up surveys. A total of 2,759 students participated in the study, including 1,473 (689 middle school students – 399 in the intervention and 290 in the control group, and 784 high school students – 377 in the intervention and 407 in the control group) at baseline, and 1,286 (695 middle school students – 413 in the intervention and 282 in the control group, and 591 high school students – 376 in the intervention and 215 in the control group) at follow-up. We used the same questionnaire in the baseline and follow-up surveys. The intervention was delivered to all students in participating schools between September 2005 (at the beginning of the semester) and February 2006 (before the end of the same semester). Students involved in the council were excluded from sampling for pre–post surveys. We obtained oral permission from students and their parents before the baseline and intervention program. Students completed the baseline and follow-up surveys anonymously in their classrooms. The study protocol received IRB approval from Beijing CDC.

Intervention Program

Prior to initiation of the study, the Institute of Health Education in the Beijing CDC organized a community council to advise on program development, implementation and evaluation. The community council included parents, teachers, local police officers, health educators and a

psychologist. With inputs from students and the community council, we developed a comprehensive school-based intervention program that included a formal in-class education curriculum; workshops involving parents, community members and traffic police; posters, flyers, first-aid training and a creative Flash design contest (students designed animated short films on the theme of traffic safety with Adobe Flash software). Most of the education curriculum was delivered in health education classes, which are weekly 90-minute classes. The intervention lasted for one academic semester (September 2005 to February 2006). Each grade was delivered the same core information but in age-appropriate formats. The program was delivered to the intervention group after the baseline survey and to the control group after the intervention group's follow-up survey. Students completed a baseline survey one week before the intervention and a follow-up survey after completion of the intervention. The response rate was as high as 99%.

Measurements

The questionnaire used in the baseline and follow-up surveys took about 15 minutes to complete and contained the following components: Part One assessed participants' demographic information, including age, gender, everyday commuting methods and daily commute time. Part Two focused on knowledge of traffic signs, including four questions with pictures of traffic signs. The total score ranged from zero to 4, with a higher score indicating greater knowledge. Part Three assessed awareness of traffic safety. Students were asked to judge the safety of 12 traffic behaviours, such as riding a bike on the sidewalk. The total score in this section ranged from zero to 12, with a higher score indicating greater knowledge and awareness of traffic safety. Part Four contained 11 questions to assess the student's recent self-reported unsafe traffic behaviours, such as riding a bike without a helmet. The total score was obtained by summing the 11 items, with a higher score indicating more unsafe traffic behaviours.

Data Analysis

We conducted the following data analysis to evaluate the effectiveness of the intervention program. First, we used Chi-square (for categorical variables) and a t-test (for continuous variables) to compare the differences between the intervention and control groups at baseline in demographic characteristics and key outcome variables (knowledge of traffic signs, awareness of traffic safety and self-reported unsafe traffic behaviours). Second, we performed Chi-square and a t-test to compare the differences in baseline and follow-up in key outcome variables in the intervention and control groups. The pre–post differences were depicted in graphs. Finally, we used a t-test to compare the intervention effects on gender and in different schools (middle school vs. high school); pre–post differences were also calculated.

Results

At baseline, 776 students in the intervention group and 697 students in the control group completed the survey. Their demographic characteristics, knowledge of traffic signs, awareness of traffic safety and self-reported unsafe traffic behaviours are described in Table 1. Compared with the control group, the intervention group had a slightly higher proportion of middle school students (51.4% in the intervention group vs. 41.6% in the control group) and more female students (53.0% in the intervention group vs. 47.8% in the control group). The most popular modes of commuting were public transportation, cycling and walking. More than half of students spent less than 30 minutes commuting (one way) every day. Students in the control group were less knowledgeable about traffic signs but showed a higher level of awareness of traffic safety and self-reported unsafe traffic behaviours.

After the intervention, the intervention group reported greater knowledge of traffic signs, greater awareness of traffic safety and fewer self-reported unsafe traffic behaviours (see Figure 1 for pre–post differences in the intervention vs. control group). All changes in key outcome variables were significant. For example, adolescents in the intervention group reported a significant increase in knowledge of traffic signs, from 2.84 to 3.31 in middle school and from 2.89 to 3.11 in high school,

compared with the control group, whose knowledge increased from 2.31 to 2.35 in middle school and from 2.82 to 2.84 in high school. The intervention group also reported a greater increase of awareness in traffic safety – from 7.43 to 9.5 in middle school and from 7.53 to 8.57 in high school vs. from 6.51 to 6.52 in middle school and from 8.92 to 7.74 in high school in the control group. The intervention group reported a decrease in self-reported unsafe traffic behaviours, from 2.13 to 1.75 in middle school and from 2.14 to 1.70 in high school, whereas the control group reported an increase in self-reported unsafe traffic behaviours, from 2.3 to 2.41 in middle school and from 2.23 to 2.63 in high school.

Table 1. Demographic characteristics and key indicators at baseline, comparing intervention and control groups

	Intervention group *n* = 776		Control group *n* = 697		
	n	%	*n*	%	*P*-value
Grade					
Middle school	399	51.4%	290	41.6%	0
High school	377	48.6%	407	58.4%	
Gender					
Male	365	47.0%	364	52.2%	.047
Female	411	53.0%	333	47.8%	
Commuting methods					
Walk	164	21.1%	104	14.9%	0
Bike	284	36.6%	306	43.9%	
Public transportation	274	35.3%	263	37.7%	
Private vehicle	45	5.8%	21	3.0%	
Others	9	1.2%	3	0.4%	
Commuting time (one way)					
<0.5 h	386	49.7%	390	56.0%	.056
0.5–1 h	251	32.3%	187	26.8%	
1–1.5 h	92	11.9%	88	12.6%	
1.5–2 h	25	3.2%	22	3.2%	
>2 h	20	2.6%	10	1.4%	
Had traffic injury last year	37	34.6%	47	39.5%	.747
Knowledge of traffic signs, mean (SD)	2.87 (1.010)		2.610 (1.064)		.000
Awareness of traffic safety, mean (SD)	7.48 (3.666)		7.92 (3.541)		.020
Unsafe traffic behaviours, mean (SD)	2.130 (2.717)		2.260 (2.594)		.360

SD = standard deviation.

Figure 1. Changes in baseline vs. follow-up in key outcome variables: comparing intervention and control groups

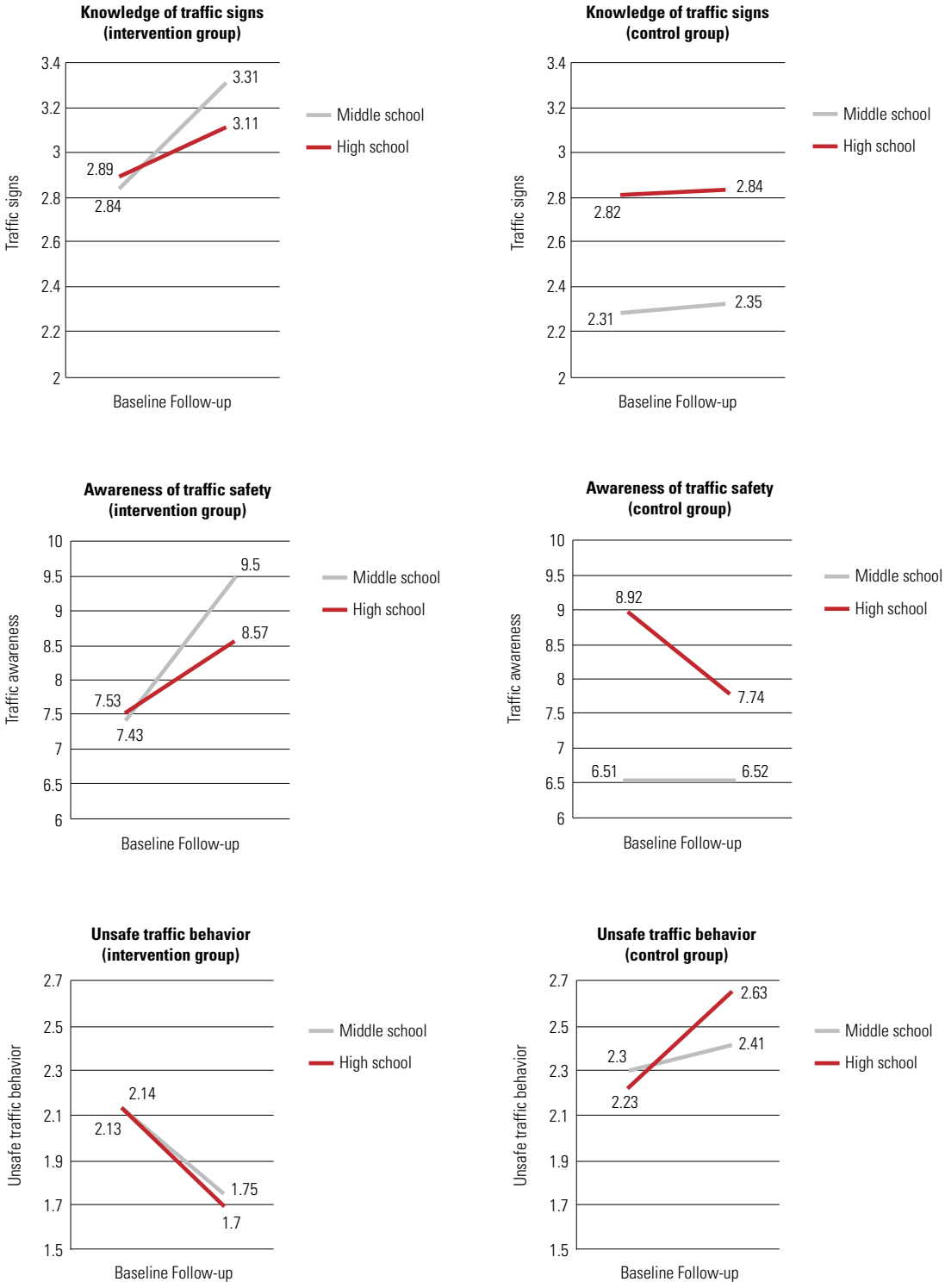

Table 2 depicts the intervention effect at different schools and in genders. The intervention had more effect in middle school than in high school students in improving knowledge of traffic signs and awareness of traffic safety. The intervention had more effect in high school than in middle school students in reducing self-reported unsafe traffic behaviours. There were also gender differences in the intervention effect. Girls and boys reported a similar increase in knowledge of traffic signs (0.32 vs. 0.38), but girls reported a greater increase in awareness of traffic safety (1.85 vs. 1.27) and a greater decrease in self-reported unsafe behaviours (-0.6 vs. -0.17). The control group reported minimal change in key outcome variables, except in awareness of traffic safety. The high school students and girls reported a lower level of awareness of traffic safety in the follow-up survey compared with the baseline survey.

Table 2. Intervention effect by grade and gender

		Knowledge of traffic signs mean (SD)			Awareness of traffic safety mean (SD)			Unsafe traffic behaviours mean (SD)		
		Pre	Post	Diff	Pre	Post	Diff	Pre	Post	Diff
Intv	**MS**	2.84 (1.01)	3.31 (0.92)	0.47* (-0.1)	7.43 (3.70)	9.50 (2.98)	2.07* (-0.72)	2.13 (2.65)	1.75 (2.36)	-0.38* (-0.29)
	HS	2.89 (1.01)	3.11 (0.95)	0.22* (-0.06)	7.53 (3.63)	8.57 (3.79)	1.04* (0.16)	2.14 (2.79)	1.70 (2.41)	-0.44* (-0.38)
	Girls	2.85 (1.01)	3.17 (0.97)	0.32* (-0.04)	7.56 (3.69)	9.41 (3.19)	1.85* (-0.50)	1.93 (2.45)	1.33 (1.86)	-0.6* (-0.59)
	Boys	2.89 (1.01)	3.27 (0.90)	0.38* (-0.11)	7.38 (3.64)	8.65 (3.63)	1.27* (-0.01)	2.36 (2.98)	2.19 (2.80)	-0.17 (-0.18)
Cntl	**MS**	2.31 (1.09)	2.35 (1.02)	0.04 (-0.07)	6.51 (3.74)	6.52 (3.80)	0.01 (0.06)	2.30 (2.51)	2.41 (2.43)	0.11 (-0.08)
	HS	2.82 (1.0)	2.84 (1.05)	0.02 (0.05)	8.92 (3.02)	7.74 (3.79)	-1.18* (0.77)	2.23 (2.65)	2.63 (3.26)	0.4 (0.60)
	Girls	2.49 (1.10)	2.52 (1.06)	0.03 (-0.03)	8.26 (3.39)	7.35 (3.78)	-0.91* (0.39)	1.69 (2.12)	1.99 (2.27)	0.3 (0.14)
	Boys	2.72 (1.02)	2.60 (1.05)	-0.12 (0.03)	7.60 (3.65)	6.80 (3.87)	-0.8* (0.22)	2.78 (2.86)	2.95 (3.15)	0.17 (0.28)

Intv = intervention group; Cntl = control group; MS = middle school; HS = high school; SD = standard deviation; Diff = difference.
*$p < .005$

Discussion and Conclusion

The current study provides evidence that a school-based traffic-safety intervention significantly increased adolescents' traffic knowledge and traffic safety awareness, and reduced their unsafe traffic behaviours. Most adolescents in the current study walked or cycled to school (60%). About 35% used public transportation for commuting, although they still needed to walk from home or school to a bus stop or subway station. Most adolescents in China are vulnerable road users. Given the very high mortality rate in vulnerable road users in China, especially in adolescents, interventions to reduce traffic accidents are urgently needed.

Our data also reveal that younger students (i.e., middle school students in the current study) experienced a greater increase in knowledge gain and awareness than older students. Such findings are consistent with other studies conducted in developed countries (Hotz et al. 2004). The data also indicate that girls were more responsive to the intervention than boys. Therefore, when we design

intervention programs to prevent traffic accidents in adolescents, we need to consider age and gender differences. Programs can begin early in the adolescent years and be reinforced throughout the middle school and high school years.

A number of limitations exist in the current study: (1) We employed an open-cohort design. Our intervention was implemented for all students in the participating schools, but only a small portion of students completed the baseline or follow-up survey. Such design was intended to minimize the disturbance of school operations and reduce the students' burden in doing surveys. (2) Our intervention was a comprehensive educational and outreach program that incorporated the active involvement of parents, teachers, traffic police and community members, but our surveys did not measure the intervention effects in these key stakeholders. (3) Our brief surveys focused only on students' knowledge and awareness of traffic safety and their self-reported unsafe traffic behaviours; students' traffic accidents were not included. Furthermore, as we used self-reports of unsafe traffic behaviours in our study, there might be a self-report and social-desirability bias. Observed behaviours are more desirable in such behavioural interventions. (4) Like all other health education interventions, participants were aware of the purpose of the intervention. Consequently, there might be testing effects and social-desirability bias in the survey responses. (5) Sample sizes in the intervention and control groups were different; such differences were due to different sizes of participating schools. (6) Awareness of traffic safety and unsafe traffic behaviours precipitously decreased and increased, respectively, among students in the control group. Our study could not provide evidence-based explanations for this finding, and it deserves further study. In addition, due to the relatively short time frame of the current study, we were not able to observe whether the increased traffic knowledge and awareness as well as decreased unsafe behaviours translated to fewer traffic accidents. However, available literature suggests that better traffic-related knowledge and fewer unsafe traffic behaviours are strongly correlated with fewer traffic accidents (Thein and Lee 1993). And finally, our study was conducted in two schools in the Chaoyang District of Beijing; findings may not be generalizable to adolescents in other middle schools and high schools in Beijing or other areas of China.

Despite these limitations, the study reports on one of the first school-based traffic-safety interventions targeting adolescents in China, and it demonstrates the effectiveness of the intervention program. After the pilot evaluation in Chaoyang District, the program was scaled up to all other schools in the Beijing municipal area. More research is needed to promote culturally appropriate traffic-injury prevention programs for adolescents in China.

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International Short-term Medical Service Trips: Guidelines from the Literature and Perspectives from the Field

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Abstract

The increasing interest in practising medicine overseas has outpaced research conducted to evaluate its effectiveness and the development of guidelines from evidence-based best practices. Short-term medical teams regularly travel to provide medical care, yet there is little research on the impact or practices of these missions. This study assessed current practices and challenges of short-term medical service teams, using questionnaire-based interviews of 40 participants in recent medical service trips. Study results and a review of recommendations in peer-reviewed journals were used to develop guidelines for international short-term medical trips in relation to mission, collaboration, education and capacity building, provider qualifications, appropriate donations, and cultural sensitivity and understanding. Guidelines that inform models, approaches, best practices and minimum standards for short-term medical service trips should be adopted so that improved and sustainable outcomes can be consistently achieved.

Introduction

Medical professionals in the United States have been increasingly travelling abroad on short-term medical service trips with the aim of improving the health of populations worldwide (Thompson et al. 2003). In 2003, an estimated 2.5 million individuals were involved in short-term outreach trips; however, the number involved in medical missions is unclear (Honig 2005; Bajkiewicz 2009). In

2004, MAP International, a non-governmental organization, provided medicines for 880 medical teams with nearly 16,000 participants, and this likely represents a relatively small portion of medical mission trips (Dohn and Dohn 2006). A more recent review identified 543 organizations involved in short-term medical service trips, with an average of 10 missions per year, at a cost of 50,000 US dollars per mission, suggesting that 250 million dollars might be a conservative estimate of annual expenditure on short-term medical mission trips (Maki et al. 2008). The health needs of populations served by mission trips are as varied as the medical approaches used to address them. Short-term trips provide services for primary healthcare, dentistry, training of local professionals, and surgical procedures to address conditions such as cleft palate and fistula, among others, as well as services following disasters such as the recent Haiti earthquake.

With the recent growth in the number of international medical service trips, there is a paucity of guidelines and evaluation measures for individuals and organizations involved. Maki et al (2008) propose an assessment tool focusing on areas of concern common to most short-term medical mission trips that incorporates host, patient and personnel perspectives; however, it has not been implemented on a widespread basis. Currently, there are no comprehensive guidelines for professionals providing medical care on international short-term medical trips in a stable development setting. The majority of existing guidelines focus on post-disaster situations, though the World Health Organization (WHO) has published guidelines on drug and medical equipment donations (The Sphere Project 2004; Pan American Health Organization [PAHO] 1999, 2003; WHO 1999, 2000). One potential challenge to the development of guidelines for short-term medical service trips is the lack of rigorous investigations into best practices of such assistance. This study sought to document experiences and lessons learned from a variety of individuals and organizations participating in short-term trips.

Methods

The study aimed to assess current practices of short-term medical service trips, document challenges encountered by participants and provide recommendations from the provider perspective on how trips should be conducted. The study was limited to participants in short-term medical service trips that (1) were less than 2 months in duration, (2) consisted of teams with at least three members, (3) were focused on general medical and surgical care (i.e., no dental trips), and (4) were to stable developing countries and were not emergency related. No list of individuals participating in short-term overseas medical service provision overseas exists, necessitating the use of a convenience sample. A pool of respondents of diverse age, experience and background was sought to increase the generalizability of the study (Grandheim and Lundman 2004). To achieve diversity among respondents, the sample was stratified by the type of organizational sponsor; approximately one third of respondents were from academic institutions, faith-based groups and secular non-governmental organizations (NGOs). Participants were recruited from organizations known to sponsor trips, networks in the medical and NGO communities and individual referral; there was approximately one (median = 1; range 1-3) respondent per organization, and no two individuals participated in the same trip. The final sample comprised 40 respondents, including health professionals and non-health professionals who had participated in international short-term medical service trips in the past 6 years.

Interviews focused on individual experiences with medical service trips and gathered detailed information on the individual's most recent trip. Interviews were between 30 and 50 minutes in duration and were conducted in person or via phone, depending on the respondent's location. All prospective participants were first read a study information sheet; if they agreed to participate, the interview was completed. The survey instrument was primarily a quantitative tool with close-ended questions; however, several open-ended questions were included to capture more detailed information on challenges and recommendations for future trips. The survey tool was developed based on discussions with individuals who had participated in medical mission trips. Prior to finalization, the instrument was piloted to ensure clarity; individuals participating in the development and piloting

of the questionnaire were not eligible to participate in the study. Data were analyzed in SPSS, version 15.0 (Chicago, IL) using standard statistical methods with a focus on individual and team/trip descriptive statistics.

The study was reviewed by the Johns Hopkins Bloomberg School of Public Health Committee on Human Research.

Results

Of the 40 respondents, the majority were female (68%) and the average age was 39 years (range 23 to 71). Participants were from 17 different states across the United States and included relatively high numbers of respondents from Maryland (35%) and California (18%). Half of those included in the final sample were physicians, followed by other health professionals (40%) and non-health professionals (10%). On their most recent trips, they had worked in 16 countries across four continents; 40% travelled with secular NGOs, 28% with academic institutions and 32% with faith-based groups. Overall, the 40 respondents had participated in 300 medical service trips, with an average of 7.5 trips per person.

Individual experiences on the most recent trip varied tremendously, as did trip objectives and team composition. Teams averaged 18 participants (range 3 to 55; median = 15.5), and 58% of respondents reported it was their first time going to the location. Descriptive characteristics of the trips and medical teams are summarized in Table 1. Over half (53%) of the trips were planned with a health-affiliated organization and/or health professional(s) in the host country. Trips were financed from a variety of sources, primarily the volunteers' personal finances (88%); other funding sources included donations (40%), grants (20%), organizational sponsors (18%), churches (13%) and medical schools (13%).[1] The average reported cost per team was 22,650 US dollars (CI 16,024 to 29,277; median = 17,820). A significant portion of costs were covered by local counterpart organizations and/or communities as in-kind support while in the country, with 80% of respondents reporting some type of local support for their team.

Table 1. Profile of team and trip

Months since most recent trip at time of interview, median (min, max)	9 (1, 68)
Type of organization participated with	
NGO, no. (%)	16 (40.0)
Faith based, no. (%)	13 (32.5)
Academic, no. (%)	11 (27.5)
Location of trip	
South America, no. (%)	14 (35.0)
Caribbean, no. (%)	10 (25.0)
Central America, no. (%)	9 (22.5)
Africa, no. (%)	5 (12.5)
Asia, no. (%)	2 (5.0)
Number of sites visited by team, mean (min, max)	2.8 (1, 10)

[1] Multiple responses were permitted.

Table 1. Continued

Area where majority of medical services were provided	
Rural, no. (%)	29 (72.5)
Urban, no. (%)	11 (27.5)
Length of trip (in days), mean (min, max)	14 (5, 49)
Length of working time (in days), mean (min, max)	11 (4, 28)
Team's primary objective for trip	
Provide medical services, no. (%)	29 (72.5)
Training, no. (%)	8 (20.0)
Of US, no. (%)	3 (7.5)
Of locals, no. (%)	4 (10.0)[a]
Faith based, no. (%)	2 (5.0)
Research, no. (%)	1 (2.5)
Culture/language exchange, no. (%)	0 (0.0)
Team's other objectives for trip, multiple answers	
Provide medical services, no. (%)	7 (17.5)
Training, no. (%)	14 (35.0)
Of US, no. (%)	6 (15.0)
Of locals, no. (%)	4 (10.0)[b]
Research, no. (%)	4 (10.0)
Faith based, no. (%)	6 (15.0)
Culture/language exchange, no. (%)	4 (10.0)
Other, no. (%)	8 (20.0)
None, no. (%)	7 (17.5)
Number of people on team, mean (min, max)	18.1 (3, 55)
Physicians, mean (min, max)	4.8 (0, 16)
Nurses, mean (min, max)	4.0 (0, 15)
Other health professionals, mean (min, max)	3.8 (0, 16)
Non-health workers, mean (min, max)	5.5 (0, 46)
First time going to site of most recent trip, no. (%)	23 (57.5)
Number of times organization has sent team to site before, mean (min, max)	13.5 (0, 100)
Team needed interpreters, no. (%)	35 (87.5)
Number of interpreters, mean (min, max)	6.3 (1, 15)

Table 1. Continued

Demographics of interpreters	
Nationals, no. (%)	28 (70.0)
Expatriats in country, no. (%)	13 (32.5)
Expatriats from organization, no. (%)	9 (22.5)
None needed, no. (%)	5 (12.5)

NGO = non-governmental organization.
[a] One interviewee did not specify who was trained; therefore percentages do not sum to the total of 20%.
[b] Four interviewees did not specify who was trained; therefore percentages do not sum to the total of 35%.

Short-term medical service trips either provided a variety of medical services or focused specifically on one type of surgery (Table 2). More than a quarter of teams (28%) focused on surgical interventions; teams offering other services tended to focus on general medicine and pediatric care. On average, teams saw a total of 1,243 patients (range 4 to 4,550; median = 630); there was no significant relationship between team size and number of patients seen per working day (p = .877, n = 30), even after stratification by service type (surgery, p = .281, n = 8; primary care, p = .690, n = 22). The lack of association between team size and patients treated may be associated with poor reporting quality, where the majority of respondents indicated that numbers provided were estimates and that patient treatment records were not maintained by organizations sponsoring the trips. Most respondents (80%) indicated that medical records were kept in the country with the local partner organization, other health organizations or patients; however, a substantial minority (20%) of records were destroyed or kept solely with the American medical team.

Table 2. Medical services

Services provided by team included	
General adult medical, no. (%)	21 (52.5)
Obstetrics/gynecology, no. (%)	10 (25.0)
Pediatrics, no. (%)	28 (70.0)
Ophthalmology, no. (%)	7 (17.5)
Surgery, no. (%)	11 (27.5)
Dentistry, no. (%)	8 (20.0)
Other, no. (%)[a]	11 (27.5)
Number of patients treated by team, mean (min, max), N = 30	1243 (4, 4550) median = 630
Medical records, either existing or created, were kept in country,[b] no. (%)	32 (80.0)
Interviewee knew that team used international algorithms or guidelines on the trip, no. (%)	5 (12.5)
Interviewee aware that team performed an assessment of the medical services provided, no. (%)	17 (42.5)
Team assessment provided to a local health organization or governmental body,[c] no. (%), N = 17	9 (52.9)

Table 2. Continued

Team provided medical training to locals, no. (%)	17 (42.5)
Profession of providers that were trained (*N*=17)	
Physicians, no. (%)	13 (76.5)
Nurses, no. (%)	8 (47.1)
Medical students, no. (%)	4 (23.5)
Community health workers, no. (%)	1 (5.9)
Others, no. (%)	5 (29.4)
Group health education was a component of the trip, no. (%)	9 (22.5)
Team provided other services, besides medical, while in host country, no. (%)	13 (32.5)
Infrastructure/construction, no. (%), *N*= 13	5 (38.5)
Faith-based activities, no. (%), *N*= 13	4 (30.8)

[a] Other included social work, cardiology, surgery referrals, orthopedics, gastroenterology, audiology, optometry, psychology, physical therapy, occupational therapy and chiropractics.
[b] Included with local coordinating organization, other local health organization or patients.
[c] Included categories marked as host organization, host Ministry of Health and other local health organization.

The majority of respondents (90%) reported that their teams brought donations, but several respondents reported not taking any, including medications, because they viewed it as building dependency (Table 3). Of the 36 respondents whose teams had donated medicines, 11% indicated medications had expired. Most donations (80%) were left with health organizations or health professionals; however, 20% of participants reported that donations were not left with qualified medical professionals or health organizations. Respondents reported that some type of guideline, including national customs regulations or personal guidelines, were followed by 30% of teams. However, awareness of international recommendations was limited. Only 13% of respondents reporting familiarity with algorithms or treatment guidelines common in developing countries, and 25% reporting awareness of the WHO Guidelines for Drug Donations (WHO 1999). While no respondents indicated that their team adhered to WHO guidelines, a few reported using components of the WHO guidelines, such as not donating expired medications or leaving drug donations with appropriately skilled professionals.

Table 3. Donations

Teams brought the following donations to the host country	
Medicines, no. (%)	36 (90.0)
Medical supplies, no. (%)	36 (90.0)
Medical equipment, no. (%)	22 (55.0)
Money, no. (%)	11 (27.5)
Other, no. (%)	25 (62.5)
None, no. (%)	2 (5.0)

Table 3. Continued

If medicines were brought, teams that brought expired medications, no. (%) *N* = 36	4 (11.1)
Supplies left in country, *N* = 35:	
Local health organization and/or health professional(s), no. (%)	27 (77.1)
Non-health organization or person(s), no. (%)	4 (11.4)
Storage for next US-based medical service trip, no. (%)	4 (11.4)
Team followed guidelines/regulations for donating medications, no. (%), *N* = 25	12 (48.0)
National customs regulations, no. (%)	6 (50.0)
Personal guidelines/beliefs, no. (%)	4 (33.3)
National regulations and personal guidelines/beliefs, no. (%)	1 (8.3)
Organizational and donor guidelines, no. (%)	1 (8.3)
Interviewee aware of WHO Drug Donation Guidelines, no. (%)	10 (25.0)

Approximately 78% of teams involved local health providers in provision of care by, and training was provided to local providers on 43% of trips, the majority of which focused on capacity building for physicians and nurses. Over half of respondents did not know whether medical licensure or approval for visiting medical professionals was required in the country where they had worked; among physicians and nurses interviewed, this proportion was lower, at 44% (Table 4).

Table 4. Involvement of local health workers

Nationals involved in patient care with team, no. (%)	31 (77.5)
Profession of nationals involved in patient care, *N* = 31	
Physicians, no. (%)	21 (67.7)
Nurses, no. (%)	25 (80.6)
Community health workers, no. (%)	4 (12.9)
Residents or medical students, no. (%)	6 (19.4)
Other, no. (%)	14 (45.2)
Ministry of Health in country aware of team's presence, no. (%), *N* = 27[a]	26 (96.3)
Interviewee's perspective on MOH's involvement with coordinating team's activities, *N* = 26	
Aware of team's activities, nothing further, no. (%)	17 (65.4)
Minor assistance with team's activities, no. (%)	4 (15.4)
Significant assistance with team's activities, no. (%)	3 (11.5)
Essential assistance with team's activities, no. (%)	1 (3.8)
Interviewee reporting requirement of government licensure or approval in host country	
Yes, no. (%)	12 (30.0)

Table 4. Continued

No, no. (%)	7 (17.5)
Do not know, no. (%)	21 (52.5)

[a] Twelve did not know, and one was missing data.

Open-ended responses revealed a more comprehensive picture that represents diverse perspectives; common themes (mentioned in open-ended questions by ≥20% of respondents) and recommendations for medical service trips from the provider's perspective are summarized in Box 1. In general, respondents stressed a capacity-building approach as the preferred model (rather than direct patient care). Education and training of local healthcare providers, in both basic and more advanced care, was viewed as a more sustainable and lasting solution for improvements in a population's health. In open-ended responses, four (10%) respondents reported that short-term medical service trips should not be conducted, based on their experiences.

Discussion

Short-term medical trips commonly face criticism on resources used, particularly pertaining to time and financial expenses (DeCamp 2007). In addition to the argument that time spent planning might be better utilized on other endeavours aimed at improving health, a parallel criticism can be made for money, where the thousands of dollars spent could have a greater impact if directly invested in the local health system (Wall et al. 2006). Alternatively, short-term medical trips can improve the lives of patients who may not have been treated otherwise. The ad hoc nature of many current trips and the variation in their goals and impact underscores the importance for the development of guidelines. In the existing literature, most publications on short-term medical trips are written from the provider's perspective. Some accounts provide only personal experiences and perspectives (DeCamp 2007; Dupuis 2004, 2006; Fairclough and Spencer 1981; Robinson 2006; Wolfberg 2006), while others have drawn on experiences to develop suggested guidelines for future teams (Ruiz-Razura et al. 2000; Suchdev et al. 2007; Wall et al. 2006; Walsh 2004; Woods and Kiely 2000; Wright et al. 2007). This study represents an initial attempt to assess short-term international medical mission trips that are conducted by a range of individuals and organizations. Recommendations were developed based on study findings and the existing literature, with the aim of facilitating dialogue and illustrating the need for further research into the positive and negative aspects of short-term medical mission trips.

Mission. *A common sense of purpose should be shared by all team members, and field activities should be evaluated to ensure they reflect team objectives.* While this is stressed in the literature, only 13% of interviewees mentioned the importance of a cohesive and transparent mission; lack of team communication and understanding were major challenges reported by some respondents. The overarching goal of most humanitarian health organizations is to reduce health disparities between populations, and the current trend is to do so via provision of medical services and supplies (Walsh 2004). If the mission is to reduce health disparities, a genuine commitment to addressing community priorities and needs is essential (Suchdev et al. 2007). However, some would argue this is beyond the scope of short-term trips and that more time is required to achieve these goals (Suchdev et al. 2007; Wolfberg 2006).

Collaboration. *Identification of an appropriate collaborating partner that is an active member of the local health infrastructure is essential to the success and impact of medical service trips.* All study participants collaborated with a local organization, though only 53% were health organizations or health professionals. That short-term medical assistance trips may bypass and undermine local health infrastructure, thereby creating dependency and more problems for future generations, is a documented concern (Banatvala and Zwi 2000). Collaboration ensures community acceptance and enhances continuity of care, thereby promoting longer-term impact (Ruiz-Razura et al. 2000; Suchdev et al. 2007; Wall et al. 2006; Wright et al. 2007). One medical mission organization has

helped to establish local NGOs through training and capacity-building efforts. These local organizations continue to provide care to underserved populations, illustrating the potential for sustainability and longer-term impacts of medical mission trips (Ruiz-Razura et al. 2000).

Education and Capacity Building. *A focus on education and training of local providers during short-term medical trips is necessary if long-term sustainable impact is to be achieved.* Fewer than half of teams in this study provided medical training to local professionals, though a quarter of respondents stressed that capacity building and education were important considerations. Integration of short-term medical service trip activities with the operations of local providers can ensure a more sustainable impact. The proposed paradigm shift for short-term medical trips suggests a focus on training and education, with increased attention given to capacity building for ongoing local interventions and providers that will remain in the community after the team has departed (DeCamp 2007; Roberts 2006; Ruiz-Razura et al. 2000; Suchdev et al. 2007; Wall et al. 2006; Wolfberg 2006; Wright et al. 2007).

Themes and recommendations for short-term medical service trips

- Have thorough logistical planning and organizing.
- Prepare for appropriate measures to overcome language barriers.
- Ensure the team understands cultural and regional components in the areas to be served, particularly in regard to health needs.
- Be cautious and thoughtful about medication and other medical donations (long-term effects, appropriateness, complications afterwards, etc.).
- Prepare for continuity of care and follow-up for when team leaves.
- Set realistic expectations for team and locals.
- Be flexible and adaptable.
- Build long-term relationships.
- Focus more on an education/training-oriented model of service versus provision of care.
- Integrate into and collaborate with local health professionals and health systems (mentioned by almost three quarters of the respondents).

Provider Qualifications. *Health professionals on international service trips should have appropriate licences from their own country and proper approval for practising medicine in countries where they provide services; not doing so is unethical* (Ruiz-Razura et al. 2000). Less than half of respondents in this study were aware of government regulations in the respective countries where they practised medicine. Some countries require an actual licence, while others require a copy of the equivalent United States licensure. Complication rates of cleft palate operations by foreign amateur physicians have been estimated at over 30%, and a study of complications occurring from short-term surgical trips reported four deaths due to anesthesia complications (Dupuis 2004; Fisher et al. 2001). Medical students and residents often participate in short-term medical trips, and with appropriate supervision this can be a valuable learning experience. However, their presence should not displace training of local providers who will continue providing care to the local population; nor should it jeopardize treatment outcomes (Wright et al. 2007).

Appropriate Donations. *Donations of non-expired medications and medical equipment should be left with trained medical personnel or health organizations to ensure proper use once the team has departed.* Among survey respondents, 77% left medical donations with health professionals or organizations, and at least 11% of teams donated expired medications. Medications are often dispensed inappropriately, including by volunteers without clinical training, or are left with individuals or organiza-

tions that are not qualified to dispense them; furthermore, distribution that is not in accordance with patient medical needs is a common problem (Roberts 2006). While international standards for drug and medical equipment donation guidelines are outlined in the WHO Guidelines for Drug Donations (1999) and the WHO Guidelines for Health Care Equipment Donations (2000), only one quarter of study respondents were aware of these guidelines, and none indicated the guidelines were followed on their most recent service trip. This suggests that sponsoring organizations should provide training surrounding this issue prior to departure for medical service trips.

Cultural Sensitivity and Understanding. *Adequate patient–provider communication, respect and understanding of cultural differences are essential for patient safety and the success of the medical service trip.* Over 40% of study participants reported that appropriate language skills are essential for a trip, indicating awareness of the issue; however, 20% reported that language barriers or lack of translators were challenges faced by their team. A key component to safety is ensuring patients have an adequate understanding of what transpires during consultations and/or a clear understanding of surgery-associated risks. Cultural sensitivity and respect are crucial concerns for visiting teams, especially in relation to understanding local medical practices and beliefs that can be crucial for patient safety (Ruiz-Razura et al. 2000).

Study Limitations

The study is limited in scope, and additional research is warranted, particularly of evaluations of short-term medical service trip impacts from the perspective of the communities they serve. The primary limitation of this study is the convenience sample; no complete list of organizations or individuals participating in short-term international medical trips existed, preventing the use of random sampling. Another important limitation is the small sample size, ideal for qualitative research but less than desirable for quantitative outcomes. Furthermore, only one member per team was interviewed. It is likely that others may have had more detailed knowledge and that having multiple respondents per team would have yielded more accurate information. Recall is also a limitation, necessitating a focus on the respondent's most recent trip rather than on cumulative experience on medical service trips. Lastly, the study was limited to US providers, who may not have responded objectively to some questions. Local communities and host organizations were not included in the study, allowing only the provider perspective to be documented; the perspective most lacking in the literature is that of the receiving population.

Conclusions

While international short-term medical service trips may be motivated by genuine humanitarian concerns, they should aim to achieve the broader objectives of enhancing local health service provision and improving health status in the communities they serve. A focus on ethical issues, professional practice and accountability needs to be maintained so that unintended negative consequences do not outweigh the benefits of services provided. Newer models for international short-term medical trips that focus on providing a mixture of capacity building and health service provision need to be considered if sustainable impacts are to be achieved. The increasing interest in practising medicine overseas has outpaced research on the effectiveness of short-term medical service trips and the formulation of evidence-based best practices for such medical teams. Development of evidence-based guidelines and minimum standards would improve the result of medical service trips by promoting health in the communities they target while ensuring minimum standards in patient care and accountability. Short-term medical service trips require considerable amounts of energy and resources and are likely to persist in the near future. Efforts to incorporate evidence-based practices and broader development objectives of sustainable improvements in community health into medical mission trips could contribute to longer-lasting and improved outcomes.

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