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Complete List of Authors:	Sarmiento-Combariza, Ivan; Universidad del Rosario, Escuela de Medicina y Ciencias de la Salud; CEMI Zuluaga, German; Universidad del Rosario, Escuela de Medicina y Ciencias de la Salud; CEMI, General Direction Andersson, Neil; McGill University, Department of Family Medicine; Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales
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Relation between access to Western Health Services and the use of Traditional Medicine for childbirth and childhood diarrhoea in Cross River State (Nigeria). A cross sectional study

Iván Sarmiento (1) (2) (corresponding author)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

Phone: +57-3132625103

E-mail: isarmiento@cemi.org.co

Germán Zuluga, MD (1) (2)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

E-mail: gzuluaga@cemi.org.co

Neil Andersson, MD (3)

Address: Department of Family Medicine, McGill University, Montreal, Canada

E-mail: andersson@ciet.org

(1) Centro de Estudios Medicos Interculturales (CEMI), Cota, Cundinamarca, Colombia

(2) Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia

(3) CIET/PRAM, Department of Family Medicine, McGill University, Montreal, Canada

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ABSTRACT

Objectives: To examine the relevance of Western health services, education, economic status, family relations and availability of Government services on the use of traditional medicine in Nigerian communities.

Design: A cross-sectional study designed to obtain population-based state level data about childbirth and three common childhood diseases.

Setting: Ninety randomly selected clusters representing the 18 local government areas (LGA) of Cross River State, in the Federal Republic of Nigeria, covered from July to August of 2011. The State ethical review committee approved the project.

Participants: A total of 8 089 women (15-49 years) in 7 685 households provided information on 11 305 children (0-36 months).

Primary and secondary outcome measures: Bivariate and then multivariate analysis focussed on reported use of traditional medicine for childbirth and childhood diarrhoea, in relation with use of Western Medicine, education, economic conditions, government presence and family relations. A trend analysis was carried out with Mantel's extension of the Mantel-Haenszel procedure.

Results: Some 24.1% (1371/5686) of the woman used traditional childbirth services, them received less government antenatal care (ORa 0.34 99%CIa 0.24-0.43), were less educated, suffered less verbal abuse, and reported children without birth certificate (X^2mh>6.65). Some 11.3% (615/5425) of the children attended for diarrhoea used traditional medicine, they were less likely to vaccination with BCG (ORa 0.49 99%CIa 0.33-0.65), had less birth certificates and lived in households with a less educated head, or using coal and wood for cooking (X^2mh>6.65). More education showed a significant association with lower use of traditional medicine (for childbirth X^2mh 135.2, for diarrhoea: X^2mh 77.2).

Conclusions: The use of traditional medicine is associated with less access to Western health services and also with a range of factors that describe a cultural change among which education plays a dominant role.

Strengths and limitations of this study

- The study is representative at the state level and included hard to reach communities
- The interviews were administered in the local language
- Fieldwork allowed to get in touch with traditional medicine practitioners and enlightened the interpretation of results
- Study was not originally designed for research about traditional medicine

INTRODUCTION

The World Health Organization recognizes the value of traditional medicine in providing health care in many countries.[1] Although not met with universal acceptance, the position is important as it supports integration of traditional health systems in countries that opt to do this. The range of responses to this position – from "a noncritical enthusiasm to an uninformed scepticism"[2] – reflects a twin problem that affects informed integration: a weak evidential base that explores the impact of traditional medicine in health, and the tools to demonstrate its impact through modern epidemiology, are poorly adjusted to fit traditional knowledge.[3] According to the *Global Atlas of Traditional, Complementary and Alternative Medicine*: "traditional medicine plays a significant role in meeting the health-care needs of the majority of Nigerians".[4] In recent years there has been growing interest in this subject in the African Region.[5,6] Various authors claim that traditional medicine is still widely used, but there are no reliable data on the current level of use in Nigeria.[7–11] Nigeria has poor coverage of formal health services,[12,13] among the highest morbidity and mortality rates in the world[14], and a high level of unsatisfied basic needs.[15]

Poverty, lack of education, and low coverage of Western medical services are reportedly associated with use of traditional medicine for a range of health conditions.[16,17] If not taken in into account formally, these factors could possibly confound studies on the efficacy of traditional medicine.

In 2011, CIET Trust conducted a cross-sectional household study in Cross River state, Nigeria, as a complement to routine information generated by the official government health system. The population-based survey collected information on health conditions, their management, and associated factors in women and children as part of the *Nigerian Evidence-based Health*

System Initiative (NEHSI),[18] a collaborative project between the Government of Nigeria, the International Development Research Centre, Canada (IDRC) and Foreign Affairs, Trade and Development (DFATD), as a response to Nigeria's commitment to health sector reform and primary health care.

The present study sought to examine the relevance of Western health services, education, economic status, family relations and availability of Government services on the use of traditional medicine in Nigerian communities. In a secondary analysis of the social audit database generated by CIET, the present study asks the questions: 1) who uses traditional medicine in Cross River? And 2) is use and non-use of traditional medicine merely a question of engagement with Western health services, or do other factors play a role during childbirth and diarrhoea management in children?

METHODS

A cross-sectional study (July and August of 2011) covered a stratified (urban/rural) last stage random sample of 90 enumeration areas of the most recent censuses in all 18 local government areas (LGA).[19] There were no exclusions. Local interviewers administered a 35-item general household questionnaire to one respondent in every household, without exception, and a team member completed a 44-item community profile with help of a local leader. Female interviewers administered an additional 108-item instrument in face-to-face interviews using the local language. This covered health status and factors associated: i) pregnancy and childbirth of women (15-49 years), and ii) occurrence of three common childhood illnesses (diarrhoea, fever, and acute respiratory infection (ARI)) in children aged 0-36 months.

The questionnaire asked about the treatment for each childhood illness and then asked about other treatment for the same illness. The child was the unit of analysis. The analysis considered

children treated with traditional medicine either as a first or second response. The difference between first and second responses provided an additional dimension of analysis. We preferred diarrhoea over ARI and fever, because even though treatment for fever has a higher number of responses, it is possible that this measure can be confounded as fever is a frequent sign for other conditions, including diarrhoea.

Interviewers asked women who were pregnant during the last two years, about who assisted them in childbirth and where did they delivered. Analysis focussed on deliveries attended by traditional medicine practitioners, traditional birth attendants or religious/ spiritual healers at any scenario, or attended by a midwife at home.

The analysis considered the use of Western medicine as women who reported going to government services for antenatal care, and children who, according to the respondent, received vaccination for BCG. The survey also asked about other vaccines received by the child (yellow fever, polio, measles, hepatitis-B, and DPT), but we used BCG as it has a well-recognised relation with antenatal care in Nigeria[20] and should be administered at birth according to Nigerian immunization policy.[21]

Contrasting use of Western medicine, we tested four groups of potential associations with the *report of having used services from a traditional medical practitioner* (for childbirth, and most recent treatment of diarrhoea in children):

a) *Education*: of the woman, head of the household, and mother, father or caregiver of the child; according with four levels: no education, elementary, junior high, senior high and higher education.

b) *Economic condition*: housing construction (defined by the use of cement and zinc roof), household self-reported financial situation (above or below community average), drinking water supply (from tap, bore hole or tube-well), type of fuel used for cooking (not coal or

wood), a report on having enough food during the last week, living in hard to reach communities, and living in urban communities.

c) *Family relations*: reports of physical or verbal abuse, and communication with the partner about pregnancy and delivery (of the birthing woman or the mother of the children)

d) *Engagement with the Government*: living in a community with public electricity and children with birth certificates.

Analysis

Statistical analysis relied on CIETmap 2.0 beta 9.5,[22] adjusting all associations for clustering by community in order to avoid overestimation of statistical confidence.[23] We expressed the relationships as adjusted Odds Ratios (ORa) and to allow for multiple significance testing we calculated 99% confidence intervals using the method of Miettinen (CIa). The analysis excluded missing data.

Variables significantly associated with the use of traditional medicine in bivariate analysis were included in the multivariate model. For each group of variables, only the strongest was used in order to avoid dilution of the effect by dependent covariates. Thus saturated with all candidate variables from the bivariate analysis, we stepped down one variable at a time until only significant associations remained, using a conservative threshold of Mantel-Haenszel (X^2mh >6.65).

The multivariate analysis presented the crude OR between variables and a weighted OR after stratification. It also gave a cluster-adjusted Mantel-Haenszel (cl adj X^2mh) to establish statistical confidence. The association was expressed with non-fixed weighted OR (non-fixed wt OR), and Cluster adjusted 99% confidence intervals (cl adj 99%CI nfwt OR).[23]

Trend analyses for the relation between use of traditional medicine and level of education used Mantel's extension of the Mantel-Haenszel procedure.

Ethics

The Cross River State research ethics committee approved the methodology and survey instruments in August 2009. Traditional authorities gave permission for fieldwork in each visited community. We applied the survey according to informed consent procedures obtained before each interview, and we assured the confidentiality and anonymity of the participants. General considerations to approaching traditional medicine were based on ethical principles for medical research in indigenous communities.[24,25]

Role of the funding source

The sponsors of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. IS, GZ, and NA had access to all the data in the study, and all authors had final responsibility for the decision to submit for publication. None of the authors have received payments for the publication of the manuscript.

RESULTS

Of 90 communities visited, 60 were rural and 30 urban. Interviewers covered 7685 households (75.5% of 10231 visited households), with an average of 85.4 households per enumeration area (SD: 13.4). Some 9.9% (760/7685) were in hard-to-reach communities, and 58.6% (4503/7685) of households had fewer than five occupants. Household heads were men in a high proportion (82.8% or 6361/7682) of interviews, and more than one half (57.2% or 4354/7613) of the household heads were engaged in low paying occupations.

Among women who responded 90.3% (7306/8089) reported on 11305 children; of these, 48.3% (3525/7306) answered for more than one child. Women reported a mean age of 26.9 years (*n:* 7975 *SD*: 7.7) and had an average of 3 children (*n:* 7321 *SD*: 1.9). Nearly all (7423/7938) had some formal education, 63.2% (5017/7938) with basic education and 7.8% (618/7938) with a high school diploma. More than one half (55.5% or 4423/7974) – reported an own source of income.

Childbirth attended by traditional medical practitioners

Some 71.8% (5735/7985) of the women were pregnant during the last two years (1.3% missing data 104/8089), and 24.1% (1371/5686) reported her last delivery was attended by a traditional medical practitioner. The remaining 33.4% (1900/5686) received Western health care at government facilities, and 15.1% (858/5686) at private facilities. Only 21.7% (1232/5686) were attended by other non-professional services (pharmacies, churches, a relative or neighbour), and 5.7% (325/5686) reported having delivered their child at home (self-attended). There was a less than 1% (49/5735) of missing data. Some 76.8% (4367/5683) of the women received government antenatal care.

Bivariate analysis showed antenatal care of the government strongly associated with non-use of traditional medicine (ORa 0.31 99%CIa 0.22-0.41). Table 1 also shows bivariate analysis for other variables investigated.

Table 1. Bivariate analysis of variables associated with childbirth attended by traditional medicine

Characteristic	Exposed	Non-exposed	ORaτ	99% CIa	MD
USE OF WESTERN MEDICINE					
Antenatal Care	808/4349	560/1300	0.31	0.22-0.41	0.7%
EDUCATION					
Woman with post-secondary or further education	31/451	1330/5201	0.25	0.13-0.37	0.6%
Woman with junior high or further	729/3629	632/2023	0.57	0.43-0.72	0.6%
Woman with some formal education	1293/5349	68/303	1.21	0.71-1.71	0.6%
Household with head with post-secondary or higher	91/832	1249/4716	0.36	0.24-0.48	2.4%

Household with head with junior high or higher	730/3596	610/1952	0.58	0.44-0.72	2.4%
Household with head with some formal education	1237/5143	103/405	0.99	0.65-1.33	2.4%
ECONOMIC CONDITION					
From household with good quality construction	796/3729	566/1922	0.68	0.47-0.90	0.6%
From household considering their financial situation as above average for the community	805/3673	558/1979	0.73	0.58-0.89	0.6%
With enough food last week	1081/4616	290/1065	0.85	0.63-1.06	0.1%
From household with safe water source	538/2340	824/3306	0.97	0.60-1.35	0.7%
Living in hard to reach communities	1203/5108	168/578	1.02	0.33-1.71	0.0%
From household using fuel different of coal or wood	365/1486	994/4161	1.10	0.73-1.48	0.7%
Living in urban communities	457/1916	914/3770	1.17	0.53-1.81	0.0%
FAMILY RELATIONS					
Not been verbally abused by partner in last 12 months	344/1728	856/3267	0.72	0.57-0.86	12.2%
Reports that neighbours were not verbally abused	143/731	1064/4285	0.76	0.57-0.95	11.8%
Not beaten by partner during last pregnancy	855/3760	347/1236	0.77	0.62-0.92	12.1%
Not beaten by partner in last 12 months	616/2807	588/2192	0.78	0.63-0.93	12.1%
Talks frequently with partner about pregnancy and delivery	847/3738	515/1904	0.80	0.65-0.96	0.8%
GOVERNMENT					
Mother of a child with birth certificate	465/2558	872/2967	0.55	0.42-0.69	2.8%
From community with electricity service	889/3920	401/1514	1.06	0.38-1.74	4.4%

τ Cluster-adjusted

Based on Table 1, the multivariate analysis included: attended by antenatal care of the government, post-secondary or further education, household with good quality construction, mother of a child with a birth certificate, and not been verbally abused by her partner in last 12 months. The final multivariate model is in Table 2. Four variables showed independent associations after adjusting for all other factors.

Table 2. Multivariate analysis for childbirth attended by traditional medicine for diarrhoea

Traditional medicine for childbirth N= 4820 Clusters adjusted by Community	**cr OR**	**wt OR**	**cl adj X^2mh**	**non-fixed wt OR**	**cl adj 99%CI nfwt OR**
Attended by antenatal care of the government	0.28	0.33	45.75	0.34	0.24-0.43
Post-secondary or higher education	0.23	0.34	31.12	0.39	0.20-0.58
Mother of a child with birth certificate	0.53	0.69	13.36	0.71	0.54-0.89
Not been verbally abused by partner in last 12 months	0.72	0.80	7.58	0.82	0.64-0.99

cr OR= crude OR
wt OR= weighted OR
cl adj X^2mh= Cluster adjusted Chi square of Mantel-Haenszel
non-fixed wt OR = non-fixed weighted OR
cl adj 99%CI nfwt OR= Cluster adjusted 99% Confidence Interval

Children with diarrhoea seen by traditional medical practitioners

Parents or caregivers answered the questions about treatment for the last episode of childhood illness: 5 570 children consulted for diarrhoea.

The local pharmacy was the most common first report for treatment of the most recent case of diarrhoea in children, 41.8% (2266/5416). Traditional medicine was the first response in a smaller proportion: 1.6% (85/5416) cases. Some 33.6% (1871/5570) responded to the question about other treatment for the same disease, of which 29.3% (549/1871) indicated traditional medicine. The majority of reported use of Traditional medicine was disclosed for the second response about "other treatment" for the same illness (Table 3). Summing first and second reports, a total of 615 out of 5425 children used traditional medicine for diarrhoea (11.3%). Children of mothers whose delivery involved traditional medical practitioners were more likely to use traditional medicine for common childhood illnesses (ORa 1.86 99%CIa 1.24-2.48 X^2mh 28.94).

Table 3. Report of attention by traditional medicine practitioner for diarrhoea

	Reported attention by traditional medicine practitioner in						
	Only first question		Only second question		First and second question		
Childhood diseases	**#**	**%**	**#**	**%**	**#**	**%**	**Total cases**
Diarrhoea	66	10.7%	530	86.2%	19	3.1%	615

The bivariate analysis showed BCG vaccination associated with non-use of traditional medicine (ORa 0.37 99%CIa 0.26-0.49). Bivariate analysis for this and other factor is shown in Table 4. A child with a report of BCG vaccine was less likely to have a mother/caregiver attended by traditional medicine (ORa 0.48 99%CI 0.32-0.64 X^2mh 96.9).

Table 4. Bivariate analysis of variables associated with a child being treated by traditional medicine for diarrhoea

Characteristic	Exposed	Non-exposed	ORaτ	99% CIa	MD
USE OF WESTERN MEDICINE					
Children with BCG vaccine	532/5091	74/299	0.37	0.26-0.49	0.7%
EDUCATION					
Household head has post-secondary or higher	34/765	567/4550	0.37	0.20-0.54	2%

Household head has junior high or higher	281/3217	320/2098	0.55	0.42-0.68	2%
Household head has some formal education	528/4811	73/504	0.77	0.52-1.03	2%
Mother/Caregiver with post-secondary or higher	13/317	571/4788	0.44	0.14-0.73	5.9%
Mother/Caregiver with junior high or higher	267/3085	317/2020	0.53	0.37-0.70	5.9%
Mother/Caregiver with some formal education	529/4777	55/328	0.69	0.38-0.99	5.9%
Father with post-secondary or higher	39/831	525/4334	0.40	0.22-0.59	4.8%
Father with junior high or higher	320/3622	244/1543	0.53	0.40-0.66	4.8%
Father with some formal education	528/4893	36/272	0.88	0.50-1.25	4.8%
ECONOMIC CONDITION					
From household using fuel different of coal or wood	71/1048	539/4345	0.56	0.34-0.78	0.6%
From household with safe water source	186/2095	428/3307	0.69	0.47-0.91	0.4%
From household with good quality construction	332/3351	282/2051	0.72	0.51-0.93	0.4%
Living in hard to reach communities	523/4832	92/593	0.79	0.35-1.23	0.0%
Living in urban communities	139/1529	476/3896	0.81	0.43-1.19	0.0%
With enough food last week	452/4091	133/1031	0.88	0.62-1.14	5.6%
From household considering their financial situation as above average for the community	370/3394	242/2004	0.92	0.68-1.17	0.5%
FAMILY RELATIONS					
Mother not beaten by partner during last pregnancy	309/3073	158/1070	0.67	0.48-0.87	23.7%
Mother not beaten by partner in last 12 months	214/2225	253/1922	0.73	0.53-0.93	23.6%
Mother not been verbally abused by partner in last 12 months	115/1232	351/2911	0.78	0.56-1.00	23.6%
Mother reports that neighbours were not verbally abused	43/497	426/3659	0.82	0.43-1.20	23.4%
Mother talks frequently with partner about pregnancy and delivery	342/3053	174/1592	1.06	0.79-1.33	14.4%
GOVERNMENT					
Child has a birth certificate	189/2539	418/2799	0.48	0.34-0.61	1.6%
From community with electricity service	328/3700	246/1524	0.55	0.33-0.78	3.7%

We selected for multivariate analysis: children with BCG vaccine, household head with post-secondary studies or higher, households using fuel different from coal or wood, and child with a birth certificate. We excluded the variables about family relations because of the high number of missing data. The final multivariate model is shown in Table 5. The four variables showed an independent association after adjusting for the others.

Table 5. Multivariate analysis for children attended by traditional medicine for diarrhoea

Traditional medicine for diarrhoea N=5180 Clusters adjusted by Community	**cr OR**	**wt OR**	**cl adj X^2mh**	**non-fixed wt OR**	**cl adj 99%CI nfwt OR**
From household where head has post secondary or further	0.32	0.39	34.6	0.44	0.23-0.65
Children with BCG vaccine	0.36	0.46	20.1	0.49	0.33-0.65
Child with birth certificate	0.47	0.56	27.3	0.59	0.42-0.75
From household using fuel different of coal or wood	0.51	0.63	10.01	0.68	0.41-0.95

cr OR= crude OR
wt OR= weighted OR
cl adj X^2mh= Cluster adjusted Chi square of Mantel-Haenszel
non-fixed wt OR = non-fixed weighted OR
cl adj 99%CI nfwt OR= Cluster adjusted 99% Confidence Interval

Trend analysis for education level

Trend analysis shows a statistically significant association between educational levels among women and a lower reliance on traditional medicine for childbirth and diarrhoea, as is shown in Table 6.

Table 6. Trend analysis of use of traditional medicine and education level of the women

Education level and childbirth attended by traditional medicine					
Woman	**No education**	**Elementary**	**Junior High**	**Senior High**	**Higher education**
Traditional medicine for Childbirth	67	564	259	439	31
Other for childbirth	233	1156	607	1873	420
Total	300	1720	866	2312	451
ORa		1.85	0.97	0.55	0.25
99% Cia		1.11-2.59	0.74-1.20	0.40-0.69	0.13-0.37
Mantel-Haenszel χ^2 for trend=135.2					

Education level and diarrhoea attended by traditional medicine					
Mother or care giver	**No education**	**Elementary**	**Junior High**	**Senior High**	**Higher education**
Traditional medicine for diarrhoea	55	262	99	155	13
Other for diarrhoea	271	1430	706	1808	304
Total	326	1692	805	1963	317
ORa		1.01	0.81	0.53	0.44
99% Cia		0.55-1.47	0.52-1.09	0.35-0.71	0.14-0.73
Mantel-Haenszel χ^2 for trend=77.2					

DISCUSSION

One in every ten children received traditional medicine to treat diarrhoea (including first and second reports) and one in every four women had her last childbirth attended by a traditional practitioner, similar proportions to those reported in 2006 in South-south zone.[26] These data probably underestimate the actual use of traditional medicine as people may hide their preferences for traditional medicine in the face of stigma.[27]

A child whose most recent event of diarrhoea was attended by a traditional practitioner was much less likely to report vaccination with BCG. A woman whose childbirth was attended by a traditional practitioner was also less likely to have had antenatal care.[28] These results are similar to others from other African countries.[29–31] The presence of Western medical services, however, might not be sufficient to understand the use or abandonment of traditional medicine.[32,33]

Coverage by the official health care system still far from universal [34] and the gap, in the case of childhood illnesses, was mainly filled by pharmacies. These are the first resource for childhood diarrhoea in Cross River state (41.8%). A study on malaria in 2010 found a similar result for childhood fever.[35] Back in 1985, Igun studied some of the reasons behind the use of retail pharmacies in Maiduguri, Nigeria.[36]

Differences among the first and second treatment reported for children echoes a study carried out in Ghana,[37] confirming the necessity for these kind of surveys to allow respondents to report "other treatment". We did not establish whether Western medicine preceded or followed traditional medicine, although this could be an opportunity for additional research.[38]

We consider it likely that our results are underestimated by important biases. First, use of traditional doctors might not be disclosed – as suggested by the relative prominence in the second response; fieldworkers suggested that reporting the use of a traditional doctor could be a cause of shame for participants. Second, because of the wording, the questions regarding the type of medical services received for each disease might have been interpreted by participants to mean "official healthcare", "traditional practitioner" might be grouped with self-care,[39] or care given by a relative or neighbour, and care given by a spiritual or religious healer confused with the healing rituals of the Christian priests. Finally, if the mortality rates for those attended by traditional medicine and those attended by western medicine differ it is possible to find a selection bias.

Our results suggest it is appropriate to consider factors other than access to Western medical services to understand use of traditional medicine. These factors operate at the individual, household and community level.[40] The multivariate analysis for childhood diarrhoea and non-use of traditional medicine included: higher education (of the household head), children living in a household using a fuel different from coal or wood for cooking, and children with a

birth certificate. Factors for use of traditional medicine at childbirth were: lower education (of the woman), verbal abuse in the last 12 months, and mothers of children without a birth certificate.

The relation between economic conditions and the use of traditional medicine remained significant only for children in households using fuel different from coal or wood for cooking. Although affordability has been recognized as an important factor associated with traditional medicine, in the context of Nigeria, the decision about treatment choices involves other considerations complimentary to the cost of services.[41] Onwujekwe, Hanson & Uzochukwu found no significant difference between low and high socio-economic status and the quality of the providers for malaria treatment.[42]

We did not find an association between traditional medicine and rural or hard to reach communities, but we cannot assure this association does not exist.[43,44] In Aba City, Izugbara, Etukudoh & Brown reported in 2005 results indicating that "urban Igbo women of different socioeconomic and demographic characteristics utilize services of rural-based health care providers-indigenous healers" and "major attractions to rural-based therapists were the failure of urban-based health services to provide cure, perceived mystical nature of conditions, need to conceal information on therapeutic progress and/or the nature of specific disease conditions, belief in rural-based therapists' ability to cure condition, and affordability of the services".[45]

The possession of an identity document for the child indicates the engagement with Government institutions. In places with stronger government presence, we expected to find more children with a birth certificate. Indeed children with birth certificates and their mothers were more likely to use services other than traditional medicine. Parents of these children were

more educated, their mothers delivered in a government health facility and lived in a wealthier household.[46]

Our results suggest a relation between verbal abuse of the partner in the last year and childbirth attended by traditional medicine. Some authors report a strong influence of family and relatives in the decision about where to seek treatment.[47–49] It is possible there was a relationship between more violence and marginality of the users of traditional medicine. However, it is also important to take into account the amount of missing data and biases linked with these socially sensitive issues.

We confirmed a gradient between levels of education and reliance on traditional medicine for childbirth and childhood diarrhoea. A similar trend was reported in Nigeria.[39,44,48] Use of traditional medicine is intrinsic to people´s culture, their beliefs and worldviews, despite the lack of scientific evidence about its effects[50] or the access to Western medicine[49]. Meanwhile, Western models of education bring a new set of beliefs and values that neglect traditional practices and occasionally condemn them.[51] These education models assimilate Western culture concepts and practices into local communities, contributing to the abandonment of traditions that were previously used for health care. Traditional practices are now relegated to "past issues". Those sceptics about the benefits of the traditional medicine join around the same recommendation: “educate and convince women to dispel myths which limit their use of orthodox care”.[40] The effects of education in poor health conditions for indigenous people has been a matter of discussion in North America.[52]

The research revealed a “transitional society where both traditional and modern medicine are employed and where the choice between them is determined by belief systems which are themselves in the process of change”,[41] suggesting abandonment of traditional health practices is not only the result of the arrival of a new medical model but also the retreat of the

older health philosophy, under the impact of a new culture brought by education. This transitional society[53] possess an array of characteristics which are necessary to better understand in order to increase the knowledge about patterns of use and implications for public health policy about them.[54]

It seems plausible that people using traditional medicine face harsher conditions of life (less education, less access to Government institutions, less use of Western health services, more domestic violence, and low socioeconomic status) producing, interacting and possibly multiplying health burdens.[55] These variables should be included as possible covariates whenever assessing the efficacy of traditional medicine.

Our study was a by-product of a much larger exercise that was not originally designed to answer the question of who uses traditional medicine. Future studies should include intercultural dialogue with traditional practitioners prior to the design.[56–60] This would help in defining the research question and identifying relevant variables that might impact on the use or abandonment of traditional medicine.[61]

CONCLUSIONS

Traditional medicine in Cross River State remains valid for delivery care and infant diarrhea, despite the availability of other services in the state. One in four women had their last childbirth attended by a traditional medical practitioner. Mothers reported care by traditional medicine for diarrhoea in one out of ten children, a few of them did it in the first question, but many more reported it as other treatment. The patronising of local pharmacies was prominent among health care services reported for childhood disease.

The access to Western medicine emerged as a major factor in the use or abandonment of traditional medicine. However, other variables such as education, economic conditions, family

relationships and linkages with government institutions also play an important role. Therefore, assuming the Western model of health does not seem to be enough to change patterns of use of health services. Besides, these variables become relevant as potential confounders in the study of traditional medicine.

Among additional factors identified, Western educational level was the most relevant variable for non-use of traditional medicine. This suggests a connection between the use of traditional medicine and culture of the people, which allows us to understand all the variables as a set of features of a society debating between maintaining their traditions or replacing them for the offers that bring Western society.

Given the important role that traditional medicine continues to play in African countries, such as Nigeria, and the results presented here, studies to assess the efficacy of traditional medicine are both urgent and necessary to optimize health care services and health outcomes.

Epidemiology applied to traditional knowledge demands an intercultural dialogue, a better recognition of the social, economic and cultural factors in health outcomes, and taking into account the role of Western education in acculturation, and therefore in the loss of traditional medicine practices.

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CONTRIBUTORS

IS designed the study and supported fieldwork in Cross River; he also analysed the data and drafted the manuscript. GZ supervised the data analysis, and contributed to the manuscript. NA designed the overall study in which this is embedded, and contributed to data analysis and write-up. All authors read and approved the final manuscript.

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COMPETING INTERESTS

All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: GZ has nothing to disclose. NA and IS report grants from Foreign Affairs, Trade and Development, Canada and grants from Canada's International Development Research Centre, during the conduct of the study.

DATA SHARING STATEMENT

This manuscript reports on results from a population based survey, the information regarding other subjects is part of the Nigeria Evidence-Based Health System Initiative (NEHISI), and can be consulted through CIET's official channels.

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 14
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7
		(*b*) Describe any methods used to examine subgroups and interactions	Page 7
		(*c*) Explain how missing data were addressed	Page 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 5
		(*e*) Describe any sensitivity analyses	Page 7
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 8
		(b) Indicate number of participants with missing data for each variable of interest	Results section
Outcome data	15*	Report numbers of outcome events or summary measures	Pages 9 and 11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Pages 9 and 11
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 13
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 14 to 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Traditional medicine used in childbirth and for childhood diarrhoea in Nigeria's Cross River State – key informant interviews and cross sectional study

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Traditional medicine used in childbirth and for childhood diarrhoea in Nigeria's Cross River State – key informant interviews and cross sectional study

Iván Sarmiento (1) (2) (corresponding author)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

Phone: +57-3132625103

E-mail: isarmiento@cemi.org.co

Germán Zuluaga, MD (1) (2)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

E-mail: gzuluaga@cemi.org.co

Neil Andersson, MD PhD (3)

Address: Department of Family Medicine, McGill University, Montreal, Canada; Centro de Investigación de Enfermedades Tropicales, Universidad Autónoma de Guerrero, Acapulco, Mexico

E-mail: andersson@ciet.org

(1) Centro de Estudios Médicos Interculturales (CEMI), Cota, Cundinamarca, Colombia

(2) Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia

(3) CIET/PRAM, Department of Family Medicine, McGill University, Montreal, Canada

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ABSTRACT

Objectives: Examine use of and factors associates with traditional medicine during childbirth and childhood diarrhoea.

Design: Cross-sectional cluster survey with household interviews of a stratified last stage random sample of 90 census enumeration areas. Unstructured interviews with traditional doctors provided qualitative information.

Setting: Oil producing Cross River State in south-eastern Nigeria has 3.5 million residents, most of whom depend on subsistence agricultural economy.

Participants: 8,089 women aged 15-49 years in 7,685 households and reported on the health of 11,305 children aged 0-36 months in July-August 2011.

Primary and secondary outcome measures: Traditional medicine used at childbirth and for management of childhood diarrhoea; covariates included availability of Western medicine, education, economic conditions, engagement with the modern state and family relations. Cluster adjusted analysis relied on the Mantel-Haenszel procedure and Mantel extension.

Results: 24.1% (1371/5686) of women reported using traditional medicine around childbirth; these women were less likely to have higher education, to access antenatal care, to avoid family violence and to have birth certificates for their children. Mothers reported 11.3% (615/5425) of children with diarrhoea sought traditional medical advice; these children were less likely to receive BCG, to have birth certificates, to live in households with a more educated head, or to use fuel other than charcoal for cooking. Increasing education showed a gradient with decreasing use of traditional medicine for childbirth (X^2 135.2) and for childhood diarrhoea (X^2 77.2)

Conclusions: The use of traditional medicine is associated with several factors related to cultural transition and to health status, with formal education playing a prominent role. Any

assessment of the effectiveness of traditional medicine should anticipate confounding by these factors.

Article focus

- Use of traditional medicine during childbirth and for childhood diarrhoea

Key messages

- Use of traditional medicine is very common, emphasising the urgent need for formal studies of effectiveness
- Factors associated with traditional medicine use are powerful determinants of health in their own right
- These studies will have to untangle the covariates of traditional medicine use

Strengths and limitations of this study

- Interviews were in the local language with locally recruited and trained interviewers
- Although not designed for research on traditional medicine, the study provides a unique opportunity to consider use of traditional medicine across the spread of conditions in the State, including hard to reach communities
- Interviews with traditional medical practitioners oriented the analysis and enriched interpretation of results

INTRODUCTION

The World Health Organisation supports integration of traditional medicine into health systems of countries that opt to do this.[1] Responses to this position range from "a noncritical enthusiasm to an uninformed scepticism",[2] reflecting a at least two obstacles to informed integration of traditional medicine: first, there is a very weak evidential base on the effectiveness of traditional medicine, and second, there is a poor fit of modern epidemiology tools to investigate the impact traditional knowledge.[3]

Poverty, lack of education, and low coverage of Western medical services are well documented associations with traditional medicine,[4] but these factors might be associated with health status in their own right, making it difficult to untangle effectiveness of traditional medicine.

In recent years there has been growing interest in traditional medicine in different African countries and recognition of its role in meeting health-care needs.[5,6] Several authors report that traditional medicine is still widely used in Nigeria, but there are no reliable data on the current level of use or its covariates.[7-9] Nigeria has notoriously poor coverage of Western health services,[10] very high rates of preventable morbidity and mortality,[11] and a high level of unsatisfied basic needs.[12]

The *Nigerian Evidence-based Health System Initiative (NEHSI),*[13] was a collaboration between the Government of Nigeria, the International Development Research Centre, Canada (IDRC) and Foreign Affairs, Trade and Development (DFATD). As part of this Initiative in Cross River State, in a series of state-wide cross-sectional household surveys (2009, 2011 and

2013) complemented routine information with information on health conditions, their management, and associated factors in women and children.

The present secondary analysis of the 2011 study examined use of traditional medicine in the context of available Western health services, education levels, economic status, family relations and engagement with the modern state in Nigerian communities. The study sought to answer the questions: 1) How common is the use of traditional medicine in Cross River State? 2) Is non-use of traditional medicine merely a question of available Western health services, or do other factors play a role?

METHODS

This second of three cross-sectional studies covered a stratified (region, urban/rural) last stage random sample of 90 census enumeration areas in all 18 local government areas (LGA).[14] There were no exclusions or replacements from the original sample. Sample size estimation at the design stage suggested 8,012 women aged 15-49 years in 90 clusters would be sufficient to detect a 20% change over two years in a maternal outcome (perinatal sepsis) at baseline affecting 24% of pregnancies (80% power, alpha error 5%, ICC 0.01), if 50% of the women were pregnant each year.

In July and August of 2011, locally recruited and trained interviewers administered a 35-item household questionnaire to one respondent in every household in the enumeration area, with no exclusions, and a team member completed a 44-item community profile with help of a local community leader. Local female interviewers administered an additional 108-item instrument in face-to-face interviews using the local language. This covered health status and factors

associated: i) Interviewers asked women aged 15-49 years who were pregnant during the last two years who had assisted them in childbirth and where they delivered; and ii) occurrence of three common childhood illnesses – diarrhoea, fever, and acute respiratory infection – among children aged 0-36 months. The questionnaire asked about the primary management of each childhood illness and then asked about secondary management of the same episode. In almost all cases, the mother provided information on each child.

During the fieldwork, one of the authors (IS) interviewed traditional medicine practitioners in 60 of the 90 clusters. The interview used the *intercultural dialogue* format,[15] with the researcher sharing his experience and knowledge of the subject to establish a two way exchange of information in which the traditional medicine practitioner could feel comfortable. All interviews were anonymous. The dialogue informed categories of analysis and interpretation of the results.

Analysis

Analysis focussed on deliveries attended by traditional medical practitioners, traditional birth attendants or religious/spiritual healers, or attended at home. Use of traditional medicine was self-reported both during pregnancy and for treatment of childhood illness. We considered children treated with traditional medicine either as a first or second response to a question about how the most recent case of diarrhoea had been handled. The difference between first and second responses provided an additional focus of analysis. We defined use of Western medicine as reported attendance of government or private medical services for antenatal care; receipt of BCG was taken as evidence of availability of Western health care for childhood illness.[16]

We tested four groups of potential associations with the *report of using a traditional medical practitioner*:

a) *Education* of the woman in question, head of the household, father or caregiver of the child formed four categories: no education, elementary, junior high, senior high and higher education;

b) *Economic condition*: housing construction (cement in walls and zinc roof), self-reported household financial situation (above or below community average), drinking water (from tap, borehole or tube-well), cooking fuel (not charcoal or wood), reporting enough food during the last week, living in hard to reach communities, and living in urban communities;

c) *Family relations*: reports of physical or verbal abuse, communication with the partner about pregnancy and delivery;

d) *Engagement with modern state*: living in a community with public electricity and children with birth certificates.

For each group of variables, we chose the single strongest association in order to avoid non-independent variables in the same multivariate model. Thus saturated with candidate variables from the bivariate analysis, we used back wise deletion one variable at a time until only significant associations remained, using a conservative threshold (X^2mh >6.65) to allow for testing multiple variables without prior specification in the study design.

Statistical analysis relied on CIETmap 2.0 beta 9.5, a Windows-like interface with the R programming language.[17] We expressed stratified results as adjusted Odds Ratios (ORa) and 99% confidence intervals using the method of Miettinen adjusted for clustering with the

method of Lamothe (CIca) to avoid overestimation of statistical confidence.[18] Analysis of the non-linear gradient between use of traditional medicine and level of education used Mantel's extension of the Mantel-Haenszel procedure.[19] The analysis excluded records with missing data.

Ethics

The Cross River State Research Ethics Committee approved the methodology and survey instruments in August 2009, with renewals for the 2011 and 2013 surveys. Local government and traditional authorities gave permission for fieldwork in each survey community. Before each interview, the interviewer obtained verbal informed consent, explained that responses were voluntary and could be stopped at any time, and explained the provisions of confidentiality and anonymity. The interviews with traditional medicine practitioners followed ethical principles for medical research in indigenous communities.[20]

Role of the funding source

The sponsors of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. IS, GZ, and NA had access to all the data in the study, and all authors had final responsibility for the decision to submit for publication. None of the authors have received payments for the preparation or publication of the manuscript.

RESULTS

Traditional medical practitioners

Interviews with traditional practitioners revealed different currents of traditional medicine, reflecting the diversity of Cross River State. Practitioners described themselves as birth attendants, native doctors, bone setters, religious leaders, medicine sellers and people with knowledge of traditional medicine. They explained their interface with government as focused in a limited number of specific moments: registration as a traditional medicine practitioner, Western training of traditional birth attendants and, in remote communities, government health promoters refer cases to traditional practitioners when these require specialist management. The traditional medicine pharmacopoeia is plant based, with prayers and invocations to activate or to potentiate the effect. Plants from the bush/forests are considered more powerful than those that grow close to dwellings, and more appropriate for treatment of advanced or complicated conditions.

The sample

Of 90 clusters in the sample, 60 were rural and 30 urban. Interviewers covered 7,685 households (75.5% of the 10,231 households in the enumeration areas), with an average of 85.4 households per cluster (SD 13.4); 58.6% (4503/7685) of households had fewer than five occupants. Some 9.9% of the households (760/7685) were in hard-to-reach communities, a high proportion were reported to be male-headed (82.8% or 6361/7682), and more than one half (57.2% or 4354/7613) of household heads were engaged in low paying occupations.

Among women who responded to the household questionnaire, 90.3% (7306/8089) reported on the health of 11,305 children in the last two years; 48.3% (3525/7306) answered for more than

one child. Women reported a mean age of 26.9 years (*n* 7975, SD 7.7) and an average of 3 children (*n* 7321 SD 1.9). Nearly all (7423/7938) had some formal education, 63.2% (5017/7938) with basic education and 7.8% (618/7938) with a high school diploma. More than one half (55.5% or 4423/7974) reported a source of income.

Childbirth attended by traditional medical practitioners

Some 71.8% (5735/7985) of women had been pregnant during the last two years (1.3% missing data 104/8089), and 24.1% (1371/5686) reported her last delivery was attended by a traditional medical practitioner; 33.4% (1900/5686) delivered at government facilities and 15.1% (858/5686) at private facilities; 21.7% (1232/5686) reported deliveries attended by other non-professional services (pharmacies, churches, a relative or neighbour), and 5.7% (325/5686) reported having delivered their child at home unattended. There were no data on place of delivery for 1% (49/5735) of respondents.

Some 76.8% (4367/5683) of the women reported attending government antenatal care when pregnant. On bivariate analysis, these women were significantly less likely to use traditional medicine (ORa 0.31 99%CIca 0.22-0.41). Table 1 shows the bivariate analysis of all variables investigated. Table 2 presents the final multivariate model with four variables showing independent statistically significant associations after adjusting for the other three.

Table 1. Bivariate analysis of childbirth attended by traditional practitioner

Characteristic	Exposed	Non-exposed	OR	99% CIca*	Missing data
USE OF WESTERN MEDICINE					
Antenatal Care	808/4349	560/1300	0.31	0.22-0.41	0.7%
EDUCATION					

Woman with post-secondary or higher education	31/451	1330/5201	0.25	0.13-0.37	0.6%
Woman with junior high or higher	729/3629	632/2023	0.57	0.43-0.72	0.6%
Woman with some formal education	1293/5349	68/303	1.21	0.71-1.71	0.6%
Household with head with post-secondary or higher	91/832	1249/4716	0.36	0.24-0.48	2.4%
Household with head with junior high or higher	730/3596	610/1952	0.58	0.44-0.72	2.4%
Household with head with some formal education	1237/5143	103/405	0.99	0.65-1.33	2.4%
ECONOMIC CONDITION					
Household of good construction	796/3729	566/1922	0.68	0.47-0.90	0.6%
Self-rated economic condition above community average	805/3673	558/1979	0.73	0.58-0.89	0.6%
Enough food last week	1081/4616	290/1065	0.85	0.63-1.06	0.1%
Household with safe water source	538/2340	824/3306	0.97	0.60-1.35	0.7%
Living in hard to reach communities	1203/5108	168/578	1.02	0.33-1.71	0.0%
Household using fuel other than charcoal or wood	365/1486	994/4161	1.10	0.73-1.48	0.7%
Living in urban communities	457/1916	914/3770	1.17	0.53-1.81	0.0%
FAMILY RELATIONS					
Not been verbally abused by partner in last 12 months	344/1728	856/3267	0.72	0.57-0.86	12.2%
Reports that neighbours were not verbally abused	143/731	1064/4285	0.76	0.57-0.95	11.8%
Not beaten by partner during last pregnancy	855/3760	347/1236	0.77	0.62-0.92	12.1%
Not beaten by partner in last 12 months	616/2807	588/2192	0.78	0.63-0.93	12.1%
Talks frequently with partner about pregnancy and delivery	847/3738	515/1904	0.80	0.65-0.96	0.8%
GOVERNMENT					
Mother of a child with birth certificate	465/2558	872/2967	0.55	0.42-0.69	2.8%
From community with electricity service	889/3920	401/1514	1.06	0.38-1.74	4.4%

Table 2. Multivariate analysis for childbirth attended by a traditional practitioner

n= 4820	crude OR	adjusted OR	99% CIca	cl adj X^2mh
Attended government antenatal care	0.28	0.33	0.21 - 0.50	45.75
Post-secondary or higher education	0.23	0.34	0.21 - 0.56	31.12
Mother of a child with birth certificate	0.53	0.69	0.53 - 0.90	13.36
Not been verbally abused by partner in last 12 months	0.72	0.80	0.65 - 0.99	7.58

cl adj X2mh= Cluster adjusted Chi square of Mantel-Haenszel

Children with diarrhoea seen by traditional medical practitioners

Mothers or caregivers answered the questions about treatment of 5,570 children who had consulted for their last episode of diarrhoea. The local pharmacy was the most common first report for treatment of 41.8% (2266/5416) of cases. Traditional medicine was the first response in 1.6% (85/5416) of the cases and, of the 33.6% (1871/5570) who reported additional

treatment for the same episode, 29.3% (549/1871) indicated traditional medicine. Adding first and second responses, 11.3% (615/5425) used traditional medicine for childhood diarrhoea.

Children of mothers whose delivery involved traditional medical practitioners were significantly more likely to use traditional medicine for common childhood illnesses (ORa 1.86, 99%CIca 1.24-2.48 X^2mh 28.9). Bivariate analysis (Table 3) showed children who had received BCG vaccination were significantly less likely to use of traditional medicine (ORa 0.37 99%CIca 0.26-0.49).

Table 3. Bivariate analysis of use of traditional medicine for childhood diarrhoea

Characteristic	Exposed	Non-exposed	Adjusted OR	99% CIca	Missing data
USE OF WESTERN MEDICINE					
Children with BCG vaccine	532/5091	74/299	0.37	0.26-0.49	0.7%
EDUCATION					
Household head has post-secondary or higher	34/765	567/4550	0.37	0.20-0.54	2%
Household head has junior high or higher	281/3217	320/2098	0.55	0.42-0.68	2%
Household head has some formal education	528/4811	73/504	0.77	0.52-1.03	2%
Mother/Caregiver with post-secondary or higher	13/317	571/4788	0.44	0.14-0.73	5.9%
Mother/Caregiver with junior high or higher	267/3085	317/2020	0.53	0.37-0.70	5.9%
Mother/Caregiver with some formal education	529/4777	55/328	0.69	0.38-0.99	5.9%
Father with post-secondary or higher	39/831	525/4334	0.40	0.22-0.59	4.8%
Father with junior high or higher	320/3622	244/1543	0.53	0.40-0.66	4.8%
Father with some formal education	528/4893	36/272	0.88	0.50-1.25	4.8%
ECONOMIC CONDITION					
From household using fuel different of charcoal or wood	71/1048	539/4345	0.56	0.34-0.78	0.6%
From household with safe water source	186/2095	428/3307	0.69	0.47-0.91	0.4%
From household with good quality construction	332/3351	282/2051	0.72	0.51-0.93	0.4%
Living in hard to reach communities	523/4832	92/593	0.79	0.35-1.23	0.0%
Living in urban communities	139/1529	476/3896	0.81	0.43-1.19	0.0%
With enough food last week	452/4091	133/1031	0.88	0.62-1.14	5.6%
From household considering their financial situation as above average for the community	370/3394	242/2004	0.92	0.68-1.17	0.5%
FAMILY RELATIONS					
Mother not beaten by partner during last pregnancy	309/3073	158/1070	0.67	0.48-0.87	23.7%
Mother not beaten by partner in last 12 months	214/2225	253/1922	0.73	0.53-0.93	23.6%
Mother not been verbally abused by partner in last 12 months	115/1232	351/2911	0.78	0.56-1.00	23.6%
Mother reports that neighbours were not verbally abused	43/497	426/3659	0.82	0.43-1.20	23.4%
Mother talks frequently with partner about pregnancy and delivery	342/3053	174/1592	1.06	0.79-1.33	14.4%

GOVERNMENT					
Child has a birth certificate	189/2539	418/2799	0.48	0.34-0.61	1.6%
From community with electricity service	328/3700	246/1524	0.55	0.33-0.78	3.7%

Multivariate analysis included: children with BCG vaccine, household head with post-secondary studies or higher, households using fuel different from charcoal or wood, children of a mother not beaten by partner during last pregnancy, and child with a birth certificate. Table 4 shows an independent association for each of the four variables after adjusting for the others.

Table 4. Multivariate analysis for children attended by traditional medicine for diarrhoea

N=5180	Crude OR	Adjusted OR	99% CIca	cl adj X^2mh
Household head has post secondary higher education	0.32	0.39	0.26 - 0.59	34.6
Children with BCG vaccine	0.36	0.46	0.29 - 0.72	20.1
Child with birth certificate	0.47	0.56	0.42 - 0.75	27.3
From household using fuel different of charcoal or wood	0.51	0.63	0.43 - 0.92	10.01

cl adj X2mh= Cluster adjusted Chi square Mantel-Haenszel

Table 5 shows a clear if non-linear trend between higher educational levels among women and a lower reliance on traditional medicine for childbirth and diarrhoea.

Table 5. Trend analysis of use of traditional medicine and education level of the women

Education level and childbirth attended by traditional medicine					
Woman	**No education**	**Elementary**	**Junior High**	**Senior High**	**Higher education**
Traditional medicine for Childbirth	67	564	259	439	31
Other for childbirth	233	1156	607	1873	420
Total	300	1720	866	2312	451
OR		1.85	0.97	0.55	0.25
Mantel-Haenszel χ^2 for trend=135.2 1df					

Education level and diarrhoea attended by traditional medicine					
Mother or care giver	**No education**	**Elementary**	**Junior High**	**Senior High**	**Higher education**
Traditional medicine for diarrhoea	55	262	99	155	13
Other for diarrhoea	271	1430	706	1808	304
Total	326	1692	805	1963	317
OR		1.01	0.81	0.53	0.44
Mantel-Haenszel χ^2 for trend=77.2 1df					

DISCUSSION

Principal findings:

One in every four women (24.1% or 1371/5686) in Cross River State had her last childbirth attended by a traditional practitioner and one in every ten children (11.3% or 615/5425) consulted a traditional practitioner to treat diarrhoea. Although likely to be underreported, use of traditional medicine was convincingly associated with non-use of Western medical services, lower levels of education, increased risk of family violence and lack of engagement with the modern state as reflected in likelihood for children to have birth certificates. Our findings indicate that any enquiry into the effectiveness of traditional medicine should take careful account of these covariates which could be determinants of health in their own right.

Strengths and limitations of the study

This one of few population-based representative studies of the context of traditional medicine. Our data probably underestimate the actual use of traditional medicine as people may hide their preferences for traditional medicine in the face of stigma.[21] Compatible with this idea in our study is the prominence of traditional medicine as the reported second recourse from mothers asked about other treatment for childhood diarrhoea. As a cross-sectional survey, one cannot reasonably conclude about causal relations, for example, between increasing levels of education and decreasing use of traditional medicine. Whatever the causality considerations, however, the association would make it very difficult to understand the effectiveness of traditional medicine since education is such a strong determinant of health status.

Comparisons with other studies

Pharmacies are the first resource for childhood diarrhoea in Cross River State (41.8%). A 2010 study found a similar result for childhood fever,[22] a pattern of self-medication that has a long history in Nigeria.[23]

Differences among the reports of traditional medicine as the first and second line of management echoes those reported in a study in Ghana,[24] suggesting the need to allow survey respondents a second option if they are to disclose use of traditional medicine. We did not establish whether choice of Western medicine preceded or followed traditional medicine, although this could be the focus of further research.[25]

We could not confirm an association between traditional medicine and residence in rural or hard to reach communities,[26,27] implying that traditional medicine is commonly used across the board in Cross River State. In Aba City, Izugbara and colleagues reported that "urban Igbo women of different socioeconomic and demographic characteristics utilize services of rural-based health care providers-indigenous healers" and "major attractions to rural-based therapists were the failure of urban-based health services to provide cure, perceived mystical nature of conditions, need to conceal information on therapeutic progress and/or the nature of specific disease conditions, belief in rural-based therapists' ability to cure condition, and affordability of the services".[28] Although affordability has been recognized as an important factor associated with traditional medicine, in Nigeria treatment choice involves considerations other than cost of services.[29] Consonant with our inability to sustain socio-economic variables in a multivariate model of traditional medicine in childbirth, Onwujekwe and colleagues found no significant difference between low and high socio-economic status and the quality of the providers for malaria treatment.[30]

We found a relation between family violence and childbirth attended by traditional medicine. Our data are not informative about the causal direction of the association between traditional medicine and family violence, but several authors report a strong influence of family and relatives in the decision about where to seek treatment.[31] The recurring theme is the relatively low cost of traditional medicine compared with Western treatments and we consider cost-related decisions a plausible explanation for what might be an indirect association with family violence.

Children with birth certificates, a marker of engagement with modern state institutions, were more likely to use services other than traditional medicine. Parents of these children were more educated, mothers delivered in a government health facility and lived in a wealthier household.[32] Our striking gradient between levels of education and reliance on traditional medicine for both childbirth and childhood diarrhoea has been reported in earlier studies in Nigeria.[27,31,33]

Western education is often accompanied by beliefs and values that neglect and sometimes condemn traditional practices[34] as Western-trained educators strive to "educate and convince women to dispel myths which limit their use of orthodox care".[35] The effects of Western education in poor health conditions for Indigenous people has been a matter of discussion in North America.[36]

Our findings are compatible with a "transitional society where both traditional and modern medicine are employed and where the choice between them is determined by belief systems

which are themselves in the process of change".[37] We believe that use and abandonment of traditional medicine is a "jagged edge" in the transition from traditional to modern, a transition unevenly mediated through education, which influences health status in complex ways.[38] Not least of these influences are the economic opportunities and incomes that come with modern education. It seems plausible that people using traditional medicine face harsher conditions of life (less education, less access to modern state machinery, less use of Western health services, and low socioeconomic status) producing, interacting and possibly multiplying health burdens.[36] These variables should be included as possible covariates whenever assessing the efficacy of traditional medicine.

Our study was a secondary analysis of an exercise not designed to answer the question of who uses traditional medicine. Future studies on this theme should include intercultural dialogue with traditional practitioners as part of the design.[39,40] This dialogue could help to refine the research question and identify factors that influence use of traditional medicine.

CONCLUSIONS

Availability of Western medicine was a factor in the abandonment of traditional medicine, but education, family relationships and linkages with government institutions also played important roles. The prominence of education suggests complex connections between the use of traditional medicine and cultural transition.

Given its continued importance in countries like Nigeria, formal studies to assess effectiveness of traditional medicine are much needed to optimize health care services and to improve health outcomes. Epidemiology applied to this traditional knowledge should be based on intercultural

dialogue, better recognition and documentation of the social, economic and cultural factors in health outcomes, and taking into account the role of Western education in acculturation and the uneven loss of traditional medicine practices.

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CONTRIBUTORS

IS designed the study and supported fieldwork in Cross River; he also analysed the data and drafted the manuscript. GZ supervised the data analysis, and contributed to the manuscript. NA designed the overall study in which this is embedded, and contributed to data analysis and write-up. All authors read and approved the final manuscript.

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COMPETING INTERESTS

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DATA SHARING

No additional data available.

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 14
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7
		(*b*) Describe any methods used to examine subgroups and interactions	Page 7
		(*c*) Explain how missing data were addressed	Page 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 5
		(*e*) Describe any sensitivity analyses	Page 7
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 8
		(b) Indicate number of participants with missing data for each variable of interest	Results section
Outcome data	15*	Report numbers of outcome events or summary measures	Pages 9 and 11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Pages 9 and 11
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 13
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 14 to 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Traditional medicine used in childbirth and for childhood diarrhoea in Nigeria's Cross River State – Interviews with traditional practitioners and a state-wide cross-sectional study

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Traditional medicine used in childbirth and for childhood diarrhoea in Nigeria's Cross River State – Interviews with traditional practitioners and a state-wide cross-sectional study

Iván Sarmiento (1) (2) (corresponding author)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

Phone: +57-3132625103

E-mail: isarmiento@cemi.org.co

Germán Zuluaga, MD (1) (2)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

E-mail: gzuluaga@cemi.org.co

Neil Andersson, MD PhD (3)

Address: Department of Family Medicine, McGill University, Montreal, Canada; Centro de Investigación de Enfermedades Tropicales, Universidad Autónoma de Guerrero, Acapulco, Mexico

E-mail: andersson@ciet.org

(1) Centro de Estudios Médicos Interculturales (CEMI), Cota, Cundinamarca, Colombia

(2) Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia

(3) CIET/PRAM, Department of Family Medicine, McGill University, Montreal, Canada

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ABSTRACT

Objectives: Examine factors associated with use of traditional medicine during childbirth and in management of childhood diarrhoea.

Design: Cross-sectional cluster survey, household interviews in a stratified last stage random sample of 90 census enumeration areas; unstructured interviews with traditional doctors.

Setting: Oil-rich Cross River State in south-eastern Nigeria has 3.5 million residents, most of whom depend on a subsistence agriculture economy.

Participants: 8,089 women aged 15-49 years in 7,685 households reported on the health of 11,305 children aged 0-36 months in July-August 2011.

Primary and secondary outcome measures: Traditional medicine used at childbirth and for management of childhood diarrhoea; covariates included access to Western medicine and education, economic conditions, engagement with the modern state and family relations. Cluster adjusted analysis relied on the Mantel-Haenszel procedure and Mantel extension.

Results: 24.1% (1371/5686) of women reported using traditional medicine at childbirth; these women had less education, accessed antenatal care less, experienced more family violence and were less likely to have birth certificates for their children. 11.3% (615/5425) of young children with diarrhoea were taken to traditional medical practitioners; these children were less likely to receive BCG, to have birth certificates, to live in households with a more educated head, or to use fuel other than charcoal for cooking. Education showed a gradient with decreasing use of traditional medicine for childbirth (X^2 135.2) and for childhood diarrhoea (X^2 77.2)

Conclusions: Use of traditional medicine is associated with several factors related to cultural transition and to health status, with formal education playing a prominent role. Any assessment of the effectiveness of traditional medicine should anticipate confounding by these factors, which are widely recognised to affect health in their own right.

Strengths and limitations of this study

- Interviews were in the local language with locally recruited and trained interviewers
- Although not designed for research on traditional medicine, the study documents use of traditional medicine in a state-wide representative sample, including hard to reach communities
- Interviews with traditional medical practitioners oriented the analysis and enriched interpretation of results.

INTRODUCTION

The World Health Organisation supports integration of traditional medicine into health systems of countries that opt to do this.[1] Responses to this position range from "a noncritical enthusiasm to an uninformed scepticism",[2] reflecting at least two obstacles to informed integration of traditional medicine: first, there is a very weak evidential base on the effectiveness of traditional medicine; second, epidemiology tools are poorly set up to investigate the impact of traditional knowledge.[3]

A central concern of modern epidemiology is to rule out indirect associations in causality. Poverty, lack of education, and low coverage of Western medical services are recognised covariates of traditional medicine,[4] but these factors might also be determinants of health status in their own right, making it difficult to untangle effectiveness of traditional medicine.

Nigeria has notoriously poor coverage of Western health services,[5] very high rates of preventable morbidity and mortality,[6] and a high level of unsatisfied basic needs.[7] In recent years there has been growing scientific interest in traditional medicine in different African countries and recognition of its role in meeting health-care needs.[8,9] Traditional medicine is still widely used in Nigeria, but there is only weak evidence on the current level of use or its covariates.[10-12]

The *Nigerian Evidence-based Health System Initiative (NEHSI)*[13] was a collaboration between the Government of Nigeria, the International Development Research Centre and the Department of Foreign Affairs, Trade and Development of Canada. As part of this initiative in Cross River State, a series of state-wide cross-sectional household surveys (2009, 2011 and 2013)

complemented routine information with information on health conditions, their management, and associated factors in women and children.

The present secondary analysis of the 2011 study examined use of traditional medicine in the context of available Western health services, education levels, economic status, family relations and engagement with the modern state in Nigerian communities. The study sought to answer two questions: how common is the use of traditional medicine in Cross River State? And: is non-use of traditional medicine merely a question of available Western health services, or do other factors play a role?

METHODS

This second of three cross-sectional studies covered a stratified (region, urban/rural) last stage random sample of 90 census enumeration areas in all 18 local government areas (LGAs).[14] There were no exclusions or replacements from the original sample. Sample size estimation at the design stage suggested 8,012 women aged 15-49 years in 90 clusters would be sufficient to detect a 20% change over two years in a maternal outcome (perinatal sepsis) at baseline affecting 24% of pregnancies (80% power, alpha error 5%, ICC 0.01), if 50% of the women were pregnant each year.

In July and August of 2011, locally recruited and trained interviewers administered a 35-item household questionnaire (see online supplementary material 1) to one respondent in every household in the enumeration area, with no exclusions, and a team member completed a 44-item community profile (see online supplementary material 2) with help of a local community leader. Local female interviewers administered an additional 108-item instrument (see online

supplementary material 3) in face-to-face interviews in the local language: women aged 15-49 years who were pregnant during the last two years were asked who had assisted them in childbirth and where they delivered; they were also asked about common illnesses among their children aged 0-36 months. This part of the questionnaire, which mothers answered in almost all cases, asked about the primary management of each childhood illness and then asked about secondary management of the same episode.

State nominated researchers and planners participated in training of fieldworkers in instrument design and supervision of fieldwork. The instruments were tested and adjusted during a pilot stage before the fieldwork and provided material for eight other publications.[14-21]

During the fieldwork, one of the authors (IS) interviewed traditional medical practitioners in 60 of the 90 clusters. Using an *intercultural dialogue* format,[22] the researcher shared his experience of the subject to establish a two-way exchange of information in which the traditional medical practitioner could feel comfortable. All interviews were anonymous. The dialogue informed categories of analysis and interpretation of the results.

Analysis

Derived from the mothers' questionnaire, self-reported use of traditional medicine during pregnancy included deliveries attended by traditional medical practitioners, traditional birth attendants or religious/spiritual healers.

From the questionnaire about children's illness, use of traditional medicine for diarrhoea was either the first response or second response to questions about how the most recent case of

diarrhoea had been handled ("Where, if anywhere, did you seek treatment for the child for the diarrhoea?" and "Where else did you seek treatment?"). The difference between first and second responses provided an additional focus of analysis. We defined access to Western medicine at childbirth as self-reported attendance of government or private medical services for antenatal care. We used vaccination with BCG as evidence of availability of Western health care for childhood illness ("Has this child received BCG injection given at birth into the left arm?").[23]

We tested four groups of potential associations between social and economic variables and self-reported use of traditional medicine: education, economic status, family relations and engagement with the modern state.

We used four categories for *education* reported in the mother's questionnaire and, from the household questionnaire, education of the head of household, father or caregiver of the child: no education, elementary, junior high, senior high and higher education. *Economic conditions/status* came from the household questionnaire and included housing construction (cement in walls and zinc roof), self-reported household financial situation (above or below community average), drinking water (from tap, borehole or tube-well), cooking fuel (not charcoal or wood), reporting enough food during the last week, living in hard to reach communities, and living in urban communities. *Family relations* derived from the mother's questionnaire and included self-reported physical or verbal abuse, and communication with the partner about pregnancy and delivery. *Engagement with the modern state* included living in a community with electricity (based on the community profile), and children with birth certificates as reported in the childhood questionnaire answered by mothers.

For each group of variables, we chose the single strongest association in order to avoid non-independent variables in the same multivariate model. With all candidate variables from the bivariate analysis, we used back wise deletion one variable at a time until only significant associations remained, using a conservative threshold (X^2mh >6.65) to allow for testing multiple variables without prior specification in the study design.

Statistical analysis relied on CIETmap 2.0 beta 9.5, a Windows-like interface with the R programming language.[24] We expressed stratified results as adjusted Odds Ratios (ORa) and 99% confidence intervals using the method of Miettinen adjusted for clustering with the method of Lamothe (CIca) to avoid overestimation of statistical confidence.[25] Analysis of the non-linear gradient between use of traditional medicine and level of education used Mantel's extension of the Mantel-Haenszel procedure.[26] Analysis excluded records with missing data.

Ethics

The Cross River State Research Ethics Committee approved the methodology and survey instruments in August 2009, with renewals for the 2011 and 2013 surveys. Local government and traditional authorities gave permission for fieldwork in each survey community. Before each interview, the interviewer obtained verbal informed consent, explained that responses were voluntary and could be stopped at any time, and explained the provisions of confidentiality and anonymity. The interviews with traditional medical practitioners followed ethical principles for medical research in indigenous communities.[27]

Role of the funding source

The sponsors of the study had no role in study design, data collection, data analysis, data

interpretation, or writing of the report. IS, GZ, and NA had access to the data and all authors had final responsibility for the decision to submit for publication. None of the authors received payment for the preparation or publication of the manuscript.

RESULTS

Traditional medical practitioners

Interviews with traditional practitioners revealed different currents of traditional medicine, reflecting the diversity of Cross River State. Practitioners described themselves as birth attendants, native doctors, bone setters, religious leaders, medicine sellers and people with knowledge of traditional medicine. They explained their interface with government health service as focused in a limited number of specific moments: registration as a traditional medical practitioner, Western training of traditional birth attendants and, in remote communities, having government health promoters refer cases to traditional practitioners when these require specialist management. The traditional medical pharmacopoeia is plant based, with prayers and invocations to activate or to potentiate the effect. Plants from the bush/forests are considered more powerful than those that grow close to dwellings, and more appropriate for treatment of advanced or complicated conditions.

The sample

Of 90 clusters in the sample, 60 were rural and 30 urban. Interviewers covered 7,685 households (75.5% of the 10,231 households in the enumeration areas), with an average of 85.4 households per cluster (SD 13.4); 58.6% (4503/7685) of households had fewer than five occupants. Some 9.9% of the households (760/7685) were in hard-to-reach communities, a high proportion were reported to be male-headed (82.8% or 6361/7682), and more than one half (57.2% or 4354/7613)

of household heads were engaged in low paying occupations.

Among women who responded to the household questionnaire, 90.3% (7306/8089) reported on the health of 11,305 children in the last two years; 48.3% (3525/7306) answered for more than one child. Women reported a mean age of 26.9 years (*n* 7975, SD 7.7) and an average of 3 children (*n* 7321 SD 1.9). Nearly all (7423/7938) had some formal education, 63.2% (5017/7938) with basic education and 7.8% (618/7938) with a high school diploma. More than one half (55.5% or 4423/7974) reported a source of income.

Childbirth attended by traditional medical practitioners

Some 71.8% (5735/7985) of women had been pregnant during the last two years (1.3% missing data 104/8089), and 24.1% (1371/5686) reported that their last delivery was attended by a traditional medical practitioner. A further 33.4% (1900/5686) delivered at government facilities and 15.1% (858/5686) at private facilities; 21.7% (1232/5686) reported deliveries attended by other non-professional services (pharmacies, churches, a relative or neighbour), and 5.7% (325/5686) reported having delivered their child at home unattended. There were no data on place of delivery for under 1% (49/5686) of respondents.

Some 76.8% (4367/5686) of the women reported attending government antenatal care when pregnant. On bivariate analysis, these women were significantly less likely to use traditional medicine (ORa 0.31 99%CIca 0.22-0.41). Table 1 shows the bivariate analysis of all variables investigated. Table 2 presents the final multivariate model with four variables showing independent statistically significant associations after adjusting for the other three.

Table 1. Bivariate analysis of childbirth attended by traditional practitioner

Characteristic	Exposed	Non-exposed	OR	99% CIca*	Missing data
USE OF WESTERN MEDICINE					
Antenatal Care	808/4349	560/1300	0.31	0.22-0.41	0.7%
EDUCATION					
Woman with post-secondary or higher education	31/451	1330/5201	0.25	0.13-0.37	0.6%
Woman with junior high or higher	729/3629	632/2023	0.57	0.43-0.72	0.6%
Woman with some formal education	1293/5349	68/303	1.21	0.71-1.71	0.6%
Household with head with post-secondary or higher	91/832	1249/4716	0.36	0.24-0.48	2.4%
Household with head with junior high or higher	730/3596	610/1952	0.58	0.44-0.72	2.4%
Household with head with some formal education	1237/5143	103/405	0.99	0.65-1.33	2.4%
ECONOMIC CONDITION					
Household of good construction	796/3729	566/1922	0.68	0.47-0.90	0.6%
Self-rated economic condition above community average	805/3673	558/1979	0.73	0.58-0.89	0.6%
Enough food last week	1081/4616	290/1065	0.85	0.63-1.06	0.1%
Household with safe water source	538/2340	824/3306	0.97	0.60-1.35	0.7%
Living in hard to reach communities	1203/5108	168/578	1.02	0.33-1.71	0.0%
Household using fuel other than charcoal or wood	365/1486	994/4161	1.10	0.73-1.48	0.7%
Living in urban communities	457/1916	914/3770	1.17	0.53-1.81	0.0%
FAMILY RELATIONS					
Not been verbally abused by partner in last 12 months	344/1728	856/3267	0.72	0.57-0.86	12.2%
Reports that neighbours were not verbally abused	143/731	1064/4285	0.76	0.57-0.95	11.8%
Not beaten by partner during last pregnancy	855/3760	347/1236	0.77	0.62-0.92	12.1%
Not beaten by partner in last 12 months	616/2807	588/2192	0.78	0.63-0.93	12.1%
Talks frequently with partner about pregnancy and delivery	847/3738	515/1904	0.80	0.65-0.96	0.8%
GOVERNMENT					
Mother of a child with birth certificate	465/2558	872/2967	0.55	0.42-0.69	2.8%
From community with electricity service	889/3920	401/1514	1.06	0.38-1.74	4.4%

Table 2. Multivariate analysis for childbirth attended by a traditional practitioner

n= 4820	crude OR	adjusted OR	99% CIca	cl adj X^2mh
Attended government antenatal care	0.28	0.33	0.21 - 0.50	45.75
Post-secondary or higher education	0.23	0.34	0.21 - 0.56	31.12
Mother of a child with birth certificate	0.53	0.69	0.53 - 0.90	13.36
Not been verbally abused by partner in last 12 months	0.72	0.80	0.65 - 0.99	7.58

cl adj X2mh= Cluster adjusted Chi square of Mantel-Haenszel

Children with diarrhoea seen by traditional medical practitioners

Mothers or caregivers answered the questions about treatment of 5,416 children who had consulted for their last episode of diarrhoea. The local pharmacy was the most common first

report for treatment of 41.8% (2266/5416) of cases. Traditional medicine was the first response in 1.6% (85/5416) of the cases and, of the 33.6% (1871/5416) who reported additional treatment for the same episode, 29.3% (549/1871) indicated traditional medicine. Adding first and second responses, 11.3% (615/5416) used traditional medicine for childhood diarrhoea.

Children of mothers whose delivery involved traditional medical practitioners were significantly more likely to use traditional medicine for common childhood illnesses (ORa 1.86, 99%CIca 1.24-2.48 X^2mh 28.9). Bivariate analysis (Table 3) showed children who had received BCG vaccination were significantly less likely to be treated with traditional medicine (ORa 0.37 99%CIca 0.26-0.49).

Table 3. Bivariate analysis of use of traditional medicine for childhood diarrhoea

Characteristic	Exposed	Non-exposed	Adjusted OR	99% CIca	Missing data
USE OF WESTERN MEDICINE					
Children with BCG vaccine	532/5091	74/299	0.37	0.26-0.49	0.7%
EDUCATION					
Household head has post-secondary or higher	34/765	567/4550	0.37	0.20-0.54	2%
Household head has junior high or higher	281/3217	320/2098	0.55	0.42-0.68	2%
Household head has some formal education	528/4811	73/504	0.77	0.52-1.03	2%
Mother/Caregiver with post-secondary or higher	13/317	571/4788	0.44	0.14-0.73	5.9%
Mother/Caregiver with junior high or higher	267/3085	317/2020	0.53	0.37-0.70	5.9%
Mother/Caregiver with some formal education	529/4777	55/328	0.69	0.38-0.99	5.9%
Father with post-secondary or higher	39/831	525/4334	0.40	0.22-0.59	4.8%
Father with junior high or higher	320/3622	244/1543	0.53	0.40-0.66	4.8%
Father with some formal education	528/4893	36/272	0.88	0.50-1.25	4.8%
ECONOMIC CONDITION					
From household using fuel different of charcoal or wood	71/1048	539/4345	0.56	0.34-0.78	0.6%
From household with safe water source	186/2095	428/3307	0.69	0.47-0.91	0.4%
From household with good quality construction	332/3351	282/2051	0.72	0.51-0.93	0.4%
Living in hard to reach communities	523/4832	92/593	0.79	0.35-1.23	0.0%
Living in urban communities	139/1529	476/3896	0.81	0.43-1.19	0.0%
With enough food last week	452/4091	133/1031	0.88	0.62-1.14	5.6%
From household considering their financial situation as above average for the community	370/3394	242/2004	0.92	0.68-1.17	0.5%
FAMILY RELATIONS					
Mother not beaten by partner during last pregnancy	309/3073	158/1070	0.67	0.48-0.87	23.7%
Mother not beaten by partner in last 12 months	214/2225	253/1922	0.73	0.53-0.93	23.6%

Mother not been verbally abused by partner in last 12 months	115/1232	351/2911	0.78	0.56-1.00	23.6%
Mother reports that neighbours were not verbally abused	43/497	426/3659	0.82	0.43-1.20	23.4%
Mother talks frequently with partner about pregnancy and delivery	342/3053	174/1592	1.06	0.79-1.33	14.4%
GOVERNMENT					
Child has a birth certificate	189/2539	418/2799	0.48	0.34-0.61	1.6%
From community with electricity service	328/3700	246/1524	0.55	0.33-0.78	3.7%

Multivariate analysis included: children with BCG vaccine, household head with post-secondary studies or higher, households using fuel different from charcoal or wood, children of a mother not beaten by her partner during last pregnancy, and child with a birth certificate.

Table 4 shows an independent association for each of the four variables after adjusting for the others. Table 5 shows a clear if non-linear trend between higher educational levels among women and a lower reliance on traditional medicine for childbirth and diarrhoea.

Table 4. Multivariate analysis for children attended by traditional medicine for diarrhoea

N=5180	Crude OR	Adjusted OR	99% CIca	cl adj X^2mh
Household head has post-secondary higher education	0.32	0.39	0.26 - 0.59	34.6
Children with BCG vaccine	0.36	0.46	0.29 - 0.72	20.1
Child with birth certificate	0.47	0.56	0.42 - 0.75	27.3
From household using fuel different of charcoal or wood	0.51	0.63	0.43 - 0.92	10.01

cl adj X2mh= Cluster adjusted Chi square Mantel-Haenszel

Table 5. Trend analysis of use of traditional medicine and education level of the women

Education level and childbirth attended by traditional medical practitioner

Woman	No education	Elementary	Junior High	Senior High	Higher education
Traditional medicine during childbirth	67	564	259	439	31
Other for childbirth	233	1156	607	1873	420
Total	300	1720	866	2312	451
OR		1.85	0.97	0.55	0.25
Mantel-Haenszel χ^2 for trend=135.2 1df					

Education level and diarrhoea attended by traditional medical practitioner

Mother or care giver	No education	Elementary	Junior High	Senior High	Higher education
Traditional medicine for diarrhoea	55	262	99	155	13
Other for diarrhoea	271	1430	706	1808	304
Total	326	1692	805	1963	317
OR		1.01	0.81	0.53	0.44
Mantel-Haenszel χ^2 for trend=77.2 1df					

DISCUSSION

Principal findings

One in every four women (24.1% or 1371/5686) in Cross River State had her last delivery attended by a traditional practitioner and one in every ten children (11.3% or 615/5425) was taken to a traditional practitioner to treat their last case of diarrhoea. Use of traditional medicine was convincingly associated with non-use of Western medical services, lower levels of education, and increased risk of family violence and lack of engagement with the modern state as reflected in children having birth certificates. Our findings indicate that any enquiry into the effectiveness of traditional medicine should take careful account of these covariates which could be determinants of health in their own right.

Strengths and limitations of the study

This is one of few population-based representative studies of the context of traditional medicine. Our data probably underestimate the actual use of traditional medicine as people may hide their preferences for traditional medicine in the face of stigma.[28] Supporting this idea in our study was the greater prominence of traditional medicine as second line of management reported by mothers when asked about other treatment for childhood diarrhoea. As a cross-sectional survey, one cannot reasonably conclude about causal relations, for example, between increasing levels of education and decreasing use of traditional medicine. Whatever the causality considerations, however, the association would make it very difficult to understand the effectiveness of traditional medicine since education is such a strong determinant of health status and health reporting.

Comparisons with other studies

Pharmacies are the first resource for childhood diarrhoea in Cross River State (41.8%). A 2010 study found a similar result for childhood fever,[29] a pattern of self-medication that has a long history in Nigeria.[30] Differences among the reports of traditional medicine as the first and second line of management echo results of a study in Ghana,[31] suggesting the need to allow survey respondents a second option if they are to disclose use of traditional medicine. We did not establish whether choice of Western medicine preceded or followed traditional medicine, although this could be the focus of further research.[32]

We could not confirm an association between traditional medicine and residence in rural or hard to reach communities,[33,34] implying that traditional medicine is commonly used across the board in Cross River State. In Aba City, Izugbara colleagues reported that "urban Igbo women of different socioeconomic and demographic characteristics utilize services of rural-based health care providers/indigenous healers" and "major attractions to rural-based therapists were the failure of urban-based health services to provide cure, perceived mystical nature of conditions, need to conceal information on therapeutic progress and/or the nature of specific disease conditions, belief in rural-based therapists' ability to cure condition, and affordability of the services".[35]

Although affordability has been recognized as an important factor associated with traditional medicine, in Nigeria treatment choice involves considerations other than cost of services.[36] Consonant with our inability to sustain socio-economic variables in a multivariate model of traditional medicine in childbirth, Onwujekwe and colleagues found no significant difference between low and high socio-economic status and the quality of the providers for malaria

treatment.[37]

We found a positive relation between family violence and childbirth attended by traditional medicine. Our data are not informative about the causal direction of the association between these factors, but several authors report a strong influence of family and relatives in the decision about where to seek treatment.[38] The recurring theme is the relatively low cost of traditional medicine compared with Western treatments and we consider cost-related decisions a plausible explanation for what might be an indirect association with family violence.

Children with birth certificates - a marker of engagement with modern state institutions - were more likely to use Western medicine. Parents of these children were also more educated; mothers delivered in a government health facility and lived in wealthier households.[15] Our striking gradient between levels of education and reliance on traditional medicine for both childbirth and childhood diarrhoea has been reported in earlier studies in Nigeria.[34,38,39]

Western education is often accompanied by beliefs and values that neglect and sometimes condemn traditional practices[40] as Western-trained educators strive to "educate and convince women to dispel myths which limit their use of orthodox care".[41] The effects of Western education in poor health conditions for Indigenous people has been a matter of discussion in North America.[42]

Our findings are compatible with a "transitional society where both traditional and modern medicine are employed and where the choice between them is determined by belief systems which are themselves in the process of change".[43] We believe that use and abandonment of

traditional medicine is a jagged edge in the transition from traditional to modern, a transition unevenly mediated through education, which influences health status in complex ways.[44] Not least of these influences are the economic opportunities and incomes that come with modern education. It seems plausible that people using traditional medicine face harsher conditions of life (less education, less access to modern state machinery, less use of Western health services, and low socioeconomic status) producing, interacting and possibly multiplying health burdens.[42] These variables should be included as possible covariates whenever assessing the efficacy of traditional medicine.

Our study was a secondary analysis of an exercise not designed to answer the question of who uses traditional medicine. Future studies on this theme should include intercultural dialogue with traditional practitioners as part of the design.[45,46] This dialogue could help to refine the research question and identify factors that influence use of traditional medicine.

CONCLUSIONS

Availability of Western medicine was a factor in the abandonment of traditional medicine, but education, family relationships and linkages with government institutions also played important roles. The prominence of education suggests complex connections between the use of traditional medicine and cultural transition.

Given its continued importance in countries like Nigeria, formal studies to assess effectiveness of traditional medicine are much needed to optimize health care services and to improve health outcomes. Epidemiology applied to this traditional knowledge should be based on intercultural dialogue, better recognition and documentation of the social, economic and cultural factors in

health outcomes, and taking into account the role of Western education in acculturation and the uneven loss of traditional medicine practices.

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CONTRIBUTORS

IS designed the study and supported fieldwork in Cross River; he also analysed the data and drafted the manuscript. GZ supervised the data analysis, and contributed to the manuscript. NA designed the overall study in which this is embedded, and contributed to data analysis and write-up. All authors read and approved the final manuscript.

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COMPETING INTERESTS

All authors have completed the ICMJE uniform disclosure form from www.icmje.org/coi_disclosure.pdf and declare: GZ has nothing to disclose. NA and IS report grants from Foreign Affairs, Trade and Development, Canada and grants from Canada's International Development Research Centre, during the conduct of the study

DATA SHARING

No additional data available.

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N2.2. GHQ – 5 July 2011

Online Supplementary Material 1

N2.2- Household Questionnaire

Part A: General Household information on socio-economic status, housing, water supply, sanitation, and hygiene *<To be obtained from the head or the senior most female or male respondent available in the household at the time of visit.>*

a. <Note name of the village/settlement>

<Use a separate page of the Bhopal book for each visited house irrespective of whether interviewed or not. In case the household was not interviewed because of reasons such as locked, no eligible person to interview or language problem, note the reason on the corresponding page of the Bhopal book for this household and move to the next house.>

Hello and greetings,
My name is _____. We are with a group called CIET that is conducting household interviews on behalf of the State Ministry of Health and the Local Government Authority. Our team members are visiting all the households in this community to hear citizens' views about health care and services, especially for women and children 0-36 months of age. With your permission we will also measure of the upper arm of your children 0-36 months of age to assess how well they are growing. The information you give us can help the Ministry and the LGA to plan and provide better health services. Your answers will be confidential; we will not write your name. You don't have to answer any question you prefer not to and you can stop the interview at any time. It will take about 20 minutes. [Pasted on back of Bhopal book]

b. Have I explained adequately the purpose of the survey? *<Yes/No>*
c. Do you understand that you do not have to answer any questions you do not wish to and that you can stop the interview at any point? *<Yes/No>*

<Only proceed with the interview if answer to b and c is yes. If the answer to either of these questions is no, try to explain the purpose again.>

d. Do you agree to participate? *<Yes/No><If No, write refused; thank the respondent and move to the next household>*

1. How many people including you live in this household (excluding visitors/guests)?
2. How many males are there in this household?
3. Starting with the youngest, please tell me the age of each male. *<Circle all males up to 3 years of age. >*
4. How many females are there in this household?
5. Starting with the youngest, please tell me the age of each female. *<Circle all females up to 3 years of age and underline all women aged 15-49 years (CBAs).>*

<Issue a sticker slip for each circled child and CBA to the accompanying female interviewers before proceeding further. Write household code and age of the child or CBA on each sticker. Paste the sticker on the corresponding page of MCQ register where the information on CBA or child is being recorded.>

<If there are no children under 36 months of age and women aged 15-49 years identified in the household, then end the interaction and go to the next household.>

<In case, the information on eligible children and CBA cannot be obtained due to non-availability of the respondent complete the GHQ and record the reason for their unavailability on the corresponding page of the MCQ registers>

6. *<Note the sex of the respondent>*
7. What is your relationship with the head of the household? *<Write 'self' or relationship, if self skip to **Q10**.>*
8. Is the head of the household a male or a female? *<male/female>*
9. What is the education of the household head? *<write highest completed class, diploma or degree/Islamia or Arabic/no education>*
10. What is the occupation of the main household breadwinner? *<Designation and organisation if employed/nature of work if self employed>*
11. What is the main language you speak at home? *<write exact language>*
12. Did you have enough food in this household during the last week? *<yes/no/don't know>*
13. Compared with other households in the community, would you say your household financial situation is above average, average, or below average?
14. How many rooms are there in this household, excluding the kitchen, bathroom and store?
15. Is the kitchen/cooking area inside the main living area or separate? *<Separate/inside living area>*
16. Is the kitchen/cooking area separate from the sleeping area? *<separate/inside sleeping area>*
17. What type of fuel do you mostly use for cooking?
    <Gas, wood, charcoal, kerosene, electric, saw dust, other (specify), none>
18. How many members of the household smoke inside the house? <write number of members or 0 >
19. Do you have treated or untreated bed nets in this house?
    *<treated/untreated/both/none/don't know. If none write N/A against **Q20**>*
20. From where did you get these bed nets? *<Bought from the market/provided by the government/don't know>*

Now some questions about the toilet in your household

21. Where do the household members go for defaecation? *<use a latrine within the household/ use a latrine outside/ within household but no latrine/ outside open field or bush>*
22. What type of toilet do you have in the household? *<Use laminated card. If a toilet exists write N/A against **Q23**>*
23. (If no toilet) What is the main reason for not having a toilet?

Now some questions about your drinking water

24. What is the main source of your water for drinking? *<use the laminated card>*
25. How far away is that source from your house? *<write the distance and the unit. If the source is within the household write within the household. >*
26. How do you treat or purify your drinking water?
27. May I see the container in which you store drinking water? *<yes/no. If NO, write N/A against **Q28-Q30** >*
28. *Observe and note if the container is covered <yes/no>*

N2.2. GHQ – 5 July 2011

29. *Observe and note if the container is clean <yes/no>*
30. *Observe and note if the container is raised from the ground level <yes/no>*

<Record the following information about the household by direct observation. Male interviewers to coordinate with female interviewers for observation if not allowed in the household>

31. *<Note the type of house construction> <zinc roof and cement or concrete walls/ zinc roof and mud walls plastered with cement/ zinc roof and mud walls/ thatched roof and mud walls plastered with cement/ thatched roof and mud walls).*
32. *Note the ventilation arrangement in the house <windows, ventilators, no system>*
33. *Note if there is garbage present in the household or around the doorstep<yes/no>*
34. *Note if there is sewage water present in the household or around the doorstep<yes/no>*
35. *Note if there are excreta present in the household or around the doorstep<yes/no>*

Thank you for your time. <Close your interview book.>We will be returning after a couple of months and bringing together groups to discuss the information that has been collected in your LGA during this survey. Thanks again.

Online Supplementary Material 2

Social audit on integrated management of childhood illnesses
Community Profile

*<Collect the following information about each village/settlement visited. Fill a separate form for each village/settlement visited either by **direct observation where possible** or by interviewing a key informant. The key informant may be a community leader, a teacher, a social worker/NGO activist, or any other knowledgeable person from the community. More than one person can be interviewed for different pieces of information.>*

Name of the primary community: _____Code:_____

Name of the settlement: _____Code:_____

Name of LCA: _____Code:_____

Name of QCA: _____Code:_____

Date of visit: _____

OBSERVATIONS

1. Condition of access road to the settlement:
   A- Poor (dirt road)
   B- Medium (flat gravel, stone)
   C- Good (paved)

2. Condition of road within the settlement:
   A- Poor (dirt road)
   B- Medium (flat gravel, stone)
   C- Good (paved)

3. Observe if there are large amounts of garbage piled in the streets?
   Yes □ No □

4. Observe if there are large amounts of human/animal excreta in the streets?
   Yes □ No □

5. Observe if there are large amounts of stagnant water/sewage in the streets?
   Yes □ No □

Assalam-o-A laikum, my name is _____. We are with a group called CIET that is conducting a survey in your LGA in collaboration with the State Ministry of Health and local government authority to hear peoples' views of health services. We are conducting household interviews in your community and as a knowledgeable person in the community we would appreciate if you could help us with some general information about your community. The information would help state Ministry of Health and Local Government Authorities to understand better the health needs of the communities and in turn better plan their services accordingly. The information would be completely confidential and no

names would be mentioned. You do not have to answer any question you do not want to and can stop the interview at any stage. It will take about 15 minutes.

a. Have I explained adequately the purpose of the survey? Yes □No □

b. Do you understand that you do not have to answer any questions you do not wish to and that you can stop the interview at any point? Yes □No □

<Proceed ONLY if the response to these two questions is "YES". If the answer to any of these questions is "NO" explain the purpose again.>
c. Do you agree to participate? Yes □No □

<Proceed only if the respondent agrees to participate. If not identify some other key informant who can provide the information. In case the profile was not filled at all write reason for the same.>

ELECTRICITY

6. Is there electricity in this town? Yes □No □ *<skip to Q8>*

7. How many hours of power are provided per day (average)? _____hr/day

8. How many private generators are there in this community? None □ Few □ Many □

GARBAGE REMOVAL

9. Is there a government system for removing garbage from this community?
Yes □No □ *<skip to Q11>*

10. If yes, how frequently is the garbage removed from the community? *<Write the period and unit as specified by the respondent. Skip to Q12>* _____
\

11. Is there another system for removing garbage from individual households in this community?
Yes □No □

12. How else do residents deal with their garbage?

_____

_____

WASTE WATER AND SEWAGE REMOVAL

13. Is there a government system for removing waste water and sewage from this community?
Yes □No □ *<skip to Q15>*

14. If yes, what is the system? (*Confirm the system by direct observation)*
All covered or piped drains □
Open/partly covered proper drains □

Partly proper, partly open drains □
All open drains □

DRINKING WATER SUPPLY

15. What is the main source for drinking water in the settlement?

A- Taps within the households □
B- Community taps □
C- Borehole within the households □
D- Community borehole □
E- Well within the household □
F- Community well □
G- River/Spring □
H- Any other source (specify): _____

16. When this fails, what is the second source?

A- Taps within the households □
B- Community taps □
C- Borehole within the households □
D- Community borehole □
E- Well within the household □
F- Community well □
G- River/Spring □
H- Any other source (specify): _____

17. How would you describe the quality of underground water in this community?

Normal □ With some taste □ Salty □ Bitter □

ACCESS TO CHILD HEALTH CARE

18. List all the health facilities ***within the settlement*** including hospitals <*Include government, private, NGOs, traditional healers.*>

Name	**Type***	**How functional is the facility?#**	**Facilities and Services** <*write yes or*			
			Immunization	**Malaria Rx**	**Antibiotics**	**ORS**

**1. Government* *2. Private qualified* *3. Private unqualified* *4. NGO* *5. Traditional*

Fully, partially, not at all

*I*9. List the information about following government health facilities in relation to this settlement.
<Skip those already included in Q18>

Arrangement	Name and address	Distance (km)	Mode of transport	Cost on transport (Round trip)
Any nearest				
Nearest providing Immunisation				
Nearest providing Anti-malarial Rx				
Nearest providing antibiotics				
Nearest providing ORS				
Nearest general or tertiary* care hospital				

*Specialist hospital or federal medical centre

20. Are there any churches that provide child health care such as immunization or treatment of childhood illnesses in this settlement? Yes □No □ *<skip to Q22>*

21. List all such churches. <Ask for names and addresses to find them so they can be visited>

Name	Address

22. Are there any other organizations providing child health care such as immunization or treatment of childhood illnesses in this settlement? Yes □No □ *<skip to Q24>*

23. List all such organizations <ask for names and where to find them so they can be interviewed>

Name	Address

24. Is there a chemist/patent medicine seller in this settlement? Yes □No □

IMMUNISATION SERVICES

25. Where do people in this community usually take their children to be immunised? *<Write exact name and address of the facility.>*

_____

_____

26. How far away is this facility from the community? *<write distance in km from centre of the community. If within community write "within community">*

_____

27. How do people usually travel to this facility?

_____

_____

28. How much time does it take to reach the facility by this means (one way)? _____

29. How much does it cost to travel to this facility by this means (round trip)? _____*Naira*

30. Apart from Polio Campaign/days, how frequently does any vaccination team/person visit this community to immunise children? *<Never or write the period and unit as specified by the respondent. If never go to Q32>*

_____

31. When was the last such visit? *<Write the period and unit as specified by the respondent>*

_____

32. When was the last Polio Campaign Day in this community? *<Write the period and unit as specified by the respondent>*

_____

33. How many polio campaign days have you had in this community in the last 12 months? _____

34. When was the last Measles vaccination Campaign in this community? *<Write the period and unit as specified by the respondent>*

_____

COMMUNITY ORGANIZATION

35. Is this settlement a member of any local area or village development committee?
Yes □No □ *<skip to Q39>*

36. Is this committee active? Yes □No □

37. How frequently does this committee meet? _____

38. When was the last meeting? _____

39. Is this settlement a member of any local area or village health committee?
Yes □No □ <*skip to Q43*>

40. If yes is this committee active? Yes □No □

41. How frequently does this committee meet? _____

42. When was the last meeting? _____

43. What is the average monthly income from all sources of an average household in this community?

_____ Naira

44. Contact name, number, and address of Community Leader, Head or Chief:

_____

_____

_____

Online Supplementary Material 3

Household questionnaire - Part B: Maternal and child health

a. Note the household code <Note the GHQ code and paste the sticker.>
b. Have I explained adequately the purpose of the survey?
c. Do you understand that you do not have to answer any questions you do not wish to and that you can stop the interview at any point?
<Only proceed with the interview if answer to b and c is yes. If the answer to any of these questions is no, try to explain the purpose again.>
d. Do you agree to participate? *<Yes/No><If No, write refused. Thank the respondent. Move to the next mother/caregiver or to the next household.>*

Section A: Woman section

1. What is your age? *<Ask from the respondent.* ***Do not copy from the household slip.*** *Write age in completed years>*
2. What is your education? *<write highest completed class, diploma or degree/ Islamia or Arabic/no education>*
3. What is your marital status? *<Single/Married/Co-habiting/Widow/Divorced/Separated>*
4. Did you have enough food for yourself during the last week?
5. Do you have any income of your own?
6. Who decides how to spend this income?
7. What danger signs during pregnancy, before starting labour, do you know of?
8. What danger signs during childbirth do you know of?
9. How often do you speak to your husband or partner about issues related to pregnancy and childbirth? *<Never/Rarely/Sometimes/Often>*
10. How many children do you have? *<write 0 or the exact number of children>*
11. How many times have you been pregnant? *<write 0 or the number of times pregnant> <If 0, go to section on DV>*
12. **Have you been pregnant in the last two years?** *<If yes, exclude a current pregnancy> <If no, write N/A for Q13-Q30 and go to Q31>*
13. For your last pregnancy, after how many months of pregnancy did you reduce your routine heavy work? *<Write 'never' or months of pregnancy>*
14. How many government antenatal checkups did you have during this last pregnancy? *<Write none or number of checkups>*
15. How many times did you go anywhere else or see anyone else for care during your pregnancy?*<Write 'none'/number of checkups>*
16. How many times did you get your urine tested during pregnancy? *<write none or number of times>*
17. Did anyone tell you that you had anything wrong with your urine during that pregnancy?
18. How many times did you get your blood pressure checked? *<write none or number of times>*
19. Did anyone tell you that you had high blood pressure during that pregnancy?
20. Did you get swelling of the face or hands?
21. During this last pregnancy did you have fits or convulsions?
22. What was the outcome of your last pregnancy *<live baby, miscarriage, abortion, stillbirth>*
23. In what month and year did you have your last delivery? *<write month and year of last*

delivery>

24. Where did you deliver? *<Write the type of facility from laminated card >*

25. Who conducted the delivery? *<Write the type of person from laminated card>*

26. Did you have a caesarean section or was your vagina cut or had a tear when you gave birth? *<CS/ vagina cut/vaginal tear/neither >* ***<If neither write NA against Q27>***

27. Did the wound open up afterwards or become infected?

28. Did you develop high fever within six weeks after this delivery?

29. Did you develop foul smelling discharge from vagina within six weeks after this delivery?

30. How long after the delivery did you have a check-up on your health by anyone? *<Write never or period and units as mentioned by the respondent>*

31. **How many children do you have who are 3 years or less than 3 years of age? *<Write number/none><If none, write N/A for Q32-Q98. Go to section on domestic violence >***

32. From where have you heard about immunizations for children? *<write 'nowhere' or source/person>*

33. Do your neighbours think it's worthwhile to immunize children?

34. Do you think it's worthwhile to immunize children?

35. Have you discussed in the family about immunization for children?

36. What do you think is the main cause of diarrhoea in children?

37. If a child has diarrhoea, should you give him/her fluids other than milk, such as water more than usual, the same as usual or less than usual? *<more than usual, the same as usual or less than usual>*

38. If a child has diarrhoea, should you give him/her food including breast milk /milk more than usual, the same as usual or less than usual? *<more than usual, the same as usual or less than usual>*

Section B: Child section

I will now ask you about your child/ren 3 years of age or less.

39. Note sex of the child.

40. What is the date of birth of the child? *<record the date of birth as DD/MM/YY. If date of birth not available help mother to give you exact age in months with reference to the child's last birthday>*

41. What is your relationship to this child? *<write relationship of the respondent to the child.>*

42. What is the education of the mother of this child? *<write highest completed class, diploma or degree/ Islamia or Arabic/no education>*

43. What is the education of the father of this child? *<write highest completed class, diploma or degree/ Islamia or Arabic/no education>*

44. Who usually takes care of this child? *<write relationship of the caregiver to the child>*

45. Would you say this child is small for his/her age, about right for age, or big for age?

46. During the malaria season how often does this child sleep under a bed net? *<always/mostly/sometime/never/don't know. If never write N/A against **Q47**>*

47. Is this bed net treated?

Breastfeeding

48. Did you feed this child the colostrum (first milk) after birth? *< use local term for colostrum>*

49. At what age (months) did you stop breast-feeding this child? *<Age in months/still breastfed/never breastfed>*

50. At what age did you give this child other liquids such as water/pap, akamu, ogi/herbal drink? *<Days/months/not yet>*

51. At what age did you give this child other solid foods? *<Days or months/not yet/don't know>*

Immunisation

52. Who decides / decided about immunizations for this child? *<write relationship of the decision maker with the child>*

53. Has this child received BCG injection given at birth into the left arm? *<Use local term to explain BCG>*

54. How many times has the child received DPT injection to prevent him/her from contracting Diphtheria, Purtussis and Tetanus, that is given into the right thigh at one month interval? *<'none' or number of times or completed course>*

55. How many times has the child received Hepatitis-B injection to prevent him/her from contracting Hepatitis B, that is given into the left thigh at birth and then at six weeks and 14 weeks of age? *<'none' or number of times or completed course>*

56. Has this child received the nine-month injection for Yellow fever given into the right arm at nine months? *<Use local terms to explain Yellow fever>*

57. How many times in the last 12 months has this child received polio drops? *<Use local terms to explain Polio>*? *<Write none or number of times>*

58. Has this child received the nine-month injection for measles given into the left arm? *<Use local terms to explain Measles> <If no or don't know, go to* ***Q60****>*

59. At what age did the child get this measles injection? *<write the age in exact months when the child had the measles vaccination>*

<If the child has not received any vaccination write N/A against ***Q60****>*

60. Did you have to pay at the health facility (in cash or kind) for any vaccination? *<No/Cash/Kind/Both>*

<If the child is more than nine months old AND has received the BCG, complete DPT and complete Hepatitis-B, measles and yellow fever injection and some polio drops, write N/A against ***Q61.*** *Also write the same if the respondent doesn't know about the immunization status of the child.>*

61. What is the main reason why this child has not received any/all immunizations

Diarrhoea

62. When did this child last suffer from diarrhoea? *<write never or how long ago, in days, weeks or months. If never go to* ***Q72****>*

63. How many days did this last episode of diarrhoea last?

64. Was there any blood in the stool?

65. During this last episode of diarrhoea, did you give the child fluids (other than milk, such as water) to drink more than usual, same as usual or less than usual? *<more than usual, same as usual or less than usual>*

66. During this last episode of diarrhoea, did you give the child food (including breast milk/milk) more than usual, same as usual or less than usual? *<more than usual, same as usual or less than usual>*

67. During this last episode of diarrhoea, did you give the child sugar salt solution or ORS? *<sugar salt solution/ORS/none/don't know>*

68. During this last episode of diarrhoea, did you give the child any medicine to stop diarrhoea?

69. Where, if anywhere, did you seek treatment for the child for the diarrhoea? *<Write type of health facility from the laminated card corresponding to the response. If nowhere/home write N/A for* ***Q70. Go to Q71****>*

70. Did the provider or facility provide ORS for the child?

71. What other treatment did you give the child for the diarrhoea?

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Severe fever

72. When did this child last suffer from severe fever? *<Write never or how long ago, in weeks or months. If never go to **Q77**>*
73. How many days did this last episode of severe fever last?
74. Where, if anywhere, did you seek treatment for the child for this last episode? *<Write type of health facility from the laminated card corresponding to the response. If nowhere/home write N/A for **Q75. Go to Q76**>*
75. What medicines did they prescribe for the severe fever?
76. What other treatment did you give the child for the severe fever?

Acute Respiratory Infection (ARI)

77. During last one year, how many times did this child suffer from an illness with fever, cough and rapid breathing? *<write never or number of times. If never go to **Q82**>*
78. When did this child last suffer from an illness with fever, cough, and rapid breathing? *<Write how long ago, in days, weeks or months.>*
79. How many days did this last episode of illness last?
80. Where, if anywhere, did you seek treatment for the child for this last episode? *<Write type of health facility from the laminated card corresponding to the response.>*
81. What other treatment did you give the child for this illness?

Measles

82. Has this child ever had measles? *<If NO, write N/A against **Q83 and Q84**>*
83. How old was the child when she/he had measles? *<write the age in exact months when had measles>*
84. How much did it cost you for the medicines and treatment for the measles? *<write 0 or exact amount in Naira>*

Experience with health services

85. Who decides about where to seek treatment for this child in case of illness? *<Write relationship of decision maker with the child>*
86. When did you **last** seek treatment for this child for illness? *<Write how long ago, in days, weeks or months.>*
87. What type of health facility or provider was it? *<use the laminated card>*
88. What is the name of that health facility or provider? *<Write the full name and address of the health facility or provider.>*
89. How much did you have to pay for travel to and from the facility or provider (round trip)?
90. How long did you have to wait to be seen by the doctor or health worker? *<record answer as hours or minutes>*
91. Did the doctor or health worker explain to you about the child's condition fully, partially or not at all? *<fully, partially, not at all>*
92. How many of the medicines prescribed did the provider or facility provide you with? *<all/some/none>*
93. How much did you have to pay for the medical treatment at the health facility or to the provider? *<write 0 or exact amount in Naira>*
94. How much did you have to pay for medicines or tests outside the facility?*<write 0 or exact amount in Naira>*

<If the child is male, go to Q97>

95. Has this child had her FGM/circumcision/flesh removed? *<If no/don't know or refused go to **Q97**.>*
96. When was this done? *<write the age in exact months.>*

97. Does this child have a birth certificate? May I see it? *<has certificate and seen/ has*

certificate but not seen/ does not have certificate/ unsure if has a certificate>

98. Now we would like to assess the nutritional status of this child. For this we need to measure his/her upper arm. May we measure his/her arm? *<If Yes, issue a MUAC card for that child and advise the caregiver to take or send the child to the team member measuring MUAC>*

<Go to the next 0-36 months old child of the same mother/ respondent and ask from ***Q39-Q98****. If there is no other 0-36 months old child with this mother/care giver, continue with the* ***section on domestic violence.***

Section C: Domestic Violence

<Before these questions on domestic violence, check to ensure that you and your respondent still have privacy. If there are children around, who are old enough to repeat what is being said, please ask the respondent to send them away. ***If you cannot conduct this part of the interview without being overheard, do not continue****>*

As we both know domestic violence is all too common. But the real size of the problem is not well known because many women keep silent about what is happening to them. I am also a woman and I know how hard it is to talk about this. I would like to ask you some questions about domestic violence. You don't have to answer these questions if you don't want to and you may ask me to stop at any time. Your answers will be kept strictly confidential.

99. How common is domestic violence in your community? *<very common, common, not common, does not happen>*
100. Have any of your neighbours ever suffered mental or verbal abuse (such as being yelled at, bad names, bickering, criticizing) by a household member?
101. Have any of your neighbours ever suffered physical abuse (such as beating, kicking, slapping) by a household member?

I am now going to ask you some questions about your own experience. As you have mentioned, domestic violence is common in your community, and some of your neighbours have suffered. I am not surprised to hear this. I myself know of a case of domestic violence<mention something about it>. I also know how hard it can be to talk about this. Please remember that anything you tell me is strictly confidential; nobody will be able to find out what you have told me.

102. In the last year have you suffered mental/verbal abuse (such as bad names, bickering, criticizing, being shouted at) from any household member?
103. In the last year, have suffered mental/verbal abuse (such as bad names, bickering, criticising, being shouted at) from your husband or partner?
104. In the last year, have you suffered physical abuse (such as beating, kicking, slapping) by any household member?
105. In the last year, have you suffered physical abuse (such as beating, kicking, slapping) by your husband or partner?
106. In your last pregnancy, did your husband or partner physically abuse you (like beating, kicking or slapping you)?
107. Have you ever felt afraid of your husband or partner?
108. Why?

Thank you very much for your time today. <Close your register>

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 14
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7
		(*b*) Describe any methods used to examine subgroups and interactions	Page 7
		(*c*) Explain how missing data were addressed	Page 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 5
		(*e*) Describe any sensitivity analyses	Page 7
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 8
		(b) Indicate number of participants with missing data for each variable of interest	Results section
Outcome data	15*	Report numbers of outcome events or summary measures	Pages 9 and 11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Pages 9 and 11
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 13
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 14 to 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Traditional medicine used in childbirth and for childhood diarrhoea in Nigeria's Cross River State – Interviews with traditional practitioners and a state-wide cross-sectional study

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Traditional medicine used in childbirth and for childhood diarrhoea in Nigeria's Cross River State – Interviews with traditional practitioners and a state-wide cross-sectional study

Iván Sarmiento (1) (2) (corresponding author)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

Phone: +57-3132625103

E-mail: isarmiento@cemi.org.co

Germán Zuluaga, MD (1) (2)

Address: Calle 12 no. 3A-21 (Cota, Cundinamarca, Colombia)

E-mail: gzuluaga@cemi.org.co

Neil Andersson, MD PhD (3)

Address: Department of Family Medicine, McGill University, Montreal, Canada; Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Acapulco, Mexico

E-mail: andersson@ciet.org

(1) Centro de Estudios Médicos Interculturales (CEMI), Cota, Cundinamarca, Colombia

(2) Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia

(3) CIET/PRAM, Department of Family Medicine, McGill University, Montreal, Canada

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ABSTRACT

Objectives: Examine factors associated with use of traditional medicine during childbirth and in management of childhood diarrhoea.

Design: Cross-sectional cluster survey, household interviews in a stratified last stage random sample of 90 census enumeration areas; unstructured interviews with traditional doctors.

Setting: Oil-rich Cross River State in south-eastern Nigeria has 3.5 million residents, most of whom depend on a subsistence agriculture economy.

Participants: 8,089 women aged 15-49 years in 7,685 households reported on the health of 11,305 children aged 0-36 months in July-August 2011.

Primary and secondary outcome measures: Traditional medicine used at childbirth and for management of childhood diarrhoea; covariates included access to Western medicine and education, economic conditions, engagement with the modern state and family relations. Cluster adjusted analysis relied on the Mantel-Haenszel procedure and Mantel extension.

Results: 24.1% (1371/5686) of women reported using traditional medicine at childbirth; these women had less education, accessed antenatal care less, experienced more family violence and were less likely to have birth certificates for their children. 11.3% (615/5425) of young children with diarrhoea were taken to traditional medical practitioners; these children were less likely to receive BCG, to have birth certificates, to live in households with a more educated head, or to use fuel other than charcoal for cooking. Education showed a gradient with decreasing use of traditional medicine for childbirth (X^2 135.2) and for childhood diarrhoea (X^2 77.2)

Conclusions: Use of traditional medicine is associated with several factors related to cultural transition and to health status, with formal education playing a prominent role. Any assessment of the effectiveness of traditional medicine should anticipate confounding by these factors, which are widely recognised to affect health in their own right.

Strengths and limitations of this study

- Locally recruited and trained interviewers conducted all interviews in the local language
- Secondary analysis of data from a large study of health service coverage in a state-wide representative sample provided interpretable data on use of traditional medicine
- Interviews with traditional medical practitioners oriented the analysis and enriched interpretation of results
- The original study was not focussed on the use of traditional medicine so only a few questions about this were included in the survey

INTRODUCTION

The World Health Organisation supports integration of traditional medicine into national health systems.[1] Reactions to the idea of bringing traditional medicine into the mainstream of health systems range from "a noncritical enthusiasm to an uninformed scepticism".[2] Important obstacles to integration of traditional medicine include a lack of evidence about the effectiveness of traditional medicine, and existing epidemiology tools not well suited to investigate the impact of traditional medicine.[3]

A central concern of modern epidemiology is to explore causality and investigate confounding in associations. Poverty, lack of education, and low coverage of Western medical services are recognised covariates of the use of traditional medicine, but these factors are also determinants of health status in their own right, making it difficult to untangle the impact of traditional medicine on health status.[4]

Nigeria has notoriously poor coverage with Western health services,[5] high rates of preventable morbidity and mortality,[6] and a high level of unsatisfied basic health needs.[7]
In recent years there has been growing scientific interest in traditional medicine in African countries and recognition of its role in meeting health-care needs.[8, 9] Traditional medicine is known to be widely used in Nigeria, but there is only weak evidence on the actual level of use or its covariates.[10-12]

The *Nigerian Evidence-based Health System Initiative (NEHSI)*[13] was a collaboration between the Government of Nigeria, the International Development Research Centre and the Department of Foreign Affairs, Trade and Development of Canada. As part of this initiative in Cross River

State, a series of state-wide cross-sectional household surveys (2009, 2011 and 2013) complemented routine information with information on health conditions, their management, and associated factors in women and children.

The present secondary analysis of data from the 2011 survey examined the use of traditional medicine in the context of available Western health services, education levels, economic status, family relations and engagement with the modern state in Nigerian communities. The study sought to determine the level of use of traditional medicine by households in Cross River State and to examine the factors associated with the use of traditional medicine, including the availability of Western health services.

METHODS

The 2011 survey covered a stratified (region, urban/rural) last stage random sample of 90 census enumeration areas in all 18 local government areas (LGAs) in Cross River State.[14] Sample size estimation at the design stage suggested 8,012 women aged 15-49 years in 90 clusters would be sufficient to detect a 20% change over two years in a maternal outcome (perinatal sepsis) affecting 24% of pregnancies at baseline (80% power, alpha error 5%, ICC 0.01), if 50% of the women were pregnant each year.

In July and August of 2011, locally recruited and trained interviewers administered a 35-item household questionnaire (see online supplementary material 1) to one respondent in each household and a team member completed a 44-item community profile (see online supplementary material 2) with help of a local community leader. Local female interviewers administered an additional 108-item instrument (see online supplementary material 3) in face-to-face interviews

with female household members aged 15-49 years. Those who were pregnant during the last two years were asked who had assisted them in childbirth and where they delivered. The questionnaire asked the caregivers (nearly always the mothers) of children aged 0-36 months about common illnesses and the primary and secondary management of episodes of these illnesses. The overall questionnaires provided data which has been analysed and published in eight other journal articles.[14-21]

Field supervisors piloted the instruments in similar communities and we made small adjustments to the instruments before the main data collection.

During the fieldwork for the household survey, one of the authors (IS) interviewed traditional medical practitioners in 60 of the 90 clusters. Using an *intercultural dialogue* format,[22] the researcher shared his experience of the subject to establish a two-way exchange of information in which the traditional medical practitioner could feel comfortable. All interviews were anonymous. The dialogue informed categories of analysis and interpretation of the results.

Analysis

Self-reported use of traditional medicine during childbirth included deliveries attended by traditional medical practitioners, traditional birth attendants or religious/spiritual healers.

Mothers reported where they sought treatment for the most recent episode of diarrhoea in children aged 0-36 months, and responses included visiting traditional medicine practitioners of various sorts. The questions allowed reporting of the first choice and second choice for treatment ("Where, if anywhere, did you seek treatment for the child for the diarrhoea?" and "Where else

did you seek treatment?"). We defined access to Western medicine during pregnancy as self-reported attendance for antenatal care at government or private medical services. We used vaccination with BCG as evidence of availability of Western health care for childhood illness ("Has this child received BCG injection given at birth into the left arm?").[23]

We examined potential associations between self-reported use of traditional medicine and access to Western medicine, and four other sets of social and economic variables: education, economic status, family relations and engagement with the modern state. We defined five levels for *education* of the woman/mother, of the household head, and of the father of the child: no education, elementary school, junior high school, senior high school, and higher education. Elements of *economic conditions/status* included: housing construction (better construction was cement in walls and zinc roof); self-reported household financial situation (above or below community average); source of drinking water (safer supply was from tap, borehole or tube-well); cooking fuel used (higher economic status was using fuel other than charcoal or wood), whether the household had enough food during the last week; household location (whether living in hard to reach communities); and whether the community was urban or rural. *Family relations* included self-reported exposure to physical or verbal abuse, and communication with the partner about pregnancy and delivery. *Engagement with the modern state* included whether the community had electricity, and whether the child had a birth certificate, as reported by the mother.

We undertook an initial bivariate analysis of all the candidate variables with the outcome of interest. For each set of variables (Access to Western health care, education, economic conditions, family relations, and engagement with the modern state), we then included in the

multivariate analysis the variable with the strongest association with the outcome in bivariate analysis, in order to avoid including non-independent variables in the same multivariate model. From an initial multivariate model that included all these candidate variables from the bivariate analysis, we used backwards deletion one variable at a time until only significant associations remained, using a conservative threshold (X^2mh >6.65) for significance, to allow for testing multiple variables without prior specification in the study design.

Statistical analysis relied on CIETmap 2.0 beta 9.5, a Windows-like interface with the R programming language.[24] We expressed associations as adjusted Odds Ratios (ORa) and 99% confidence intervals using the method of Miettinen, adjusted for clustering with the method of Lamothe (CIca) to avoid overestimation of statistical confidence.[25] Analysis of the non-linear gradient between use of traditional medicine and level of education used Mantel's extension of the Mantel-Haenszel procedure.[26] Analysis excluded records with missing data.

Ethics

The Cross River State Research Ethics Committee approved the methodology and survey instruments in August 2009, with renewals for the 2011 and 2013 surveys. Local government and traditional authorities gave permission for fieldwork in each community. Before each interview, the interviewer obtained verbal informed consent, explained that responses were voluntary and could be stopped at any time, and explained the provisions of confidentiality and anonymity. The interviews with traditional medical practitioners followed ethical principles for medical research in indigenous communities.[27]

RESULTS

Traditional medical practitioners

Interviews with traditional practitioners revealed different forms of traditional medicine, reflecting the diversity of Cross River State. Practitioners described themselves as birth attendants, native doctors, bone setters, religious leaders, medicine sellers and people with knowledge of traditional medicine. They described their interface with government health services as a limited number of specific moments: registration as a traditional medical practitioner; traditional birth attendants receiving Western training; and, in remote communities, government health promoters referring certain types of cases to traditional practitioners.

Traditional practitioners explained their medical pharmacopoeia is plant based, with prayers and invocations to activate or to potentiate the effect. Plants from the bush or forests are considered more powerful than those that grow close to dwellings, and more appropriate for treatment of advanced or complicated conditions.

The sample

Of 90 clusters in the sample, 60 were rural and 30 urban. Interviewers covered 7,685 households (75.5% of the 10,231 households in the enumeration areas), with an average of 85.4 households per cluster (SD 13.4); 58.6% (4503/7685) of households had fewer than five occupants. Some 9.9% of the households (760/7685) were in hard-to-reach communities, most were male-headed (82.8%, 6361/7682), and more than one half (57.2% or 4354/7613) of household heads were engaged in low paying occupations.

Among women who responded to the questionnaire, 90.3% (7306/8089) reported on the health of

11,305 children in the last two years; 48.3% (3525/7306) answered for more than one child. Women respondents had a mean age of 26.9 years (*n* 7975, SD 7.7) and an average of 3 children (*n* 7321 SD 1.9). Nearly all the women (7423/7938) had some formal education: 63.2% (5017/7938) had primary education and 7.8% (618/7938) had a high school diploma. More than one half (55.5% or 4423/7974) of the women reported a source of income of their own.

Childbirth attended by traditional medical practitioners

Some 71.8% (5735/7985) of women had been pregnant during the last two years (1.3% missing data 104/8089), and 24.1% (1371/5686) reported that their last delivery was attended by a traditional medical practitioner. A further 33.4% (1900/5686) delivered at government facilities and 15.1% (858/5686) at private facilities; 21.7% (1232/5686) reported deliveries attended by other non-professional services (pharmacies, churches, a relative or neighbour), and 5.7% (325/5686) reported having delivered their child at home unattended. There were no data on place of delivery for under 1% (49/5686) of respondents.

Some 76.8% (4367/5686) of the women reported attending government antenatal care during their last pregnancy. In bivariate analysis, women who attended for government antenatal care were significantly less likely to use a traditional practitioner for childbirth (ORa 0.31 99%CIca 0.22-0.41). Table 1 shows the bivariate analysis of all variables examined for association with use of traditional practitioners for childbirth. Table 2 presents the final multivariate model with four variables showing independent statistically significant associations after adjusting for the other three.

Table 1. Bivariate analysis of associations with having childbirth attended by a traditional practitioner, among women aged 15-49 who gave birth in the last two years

Characteristic	Exposed	Non-exposed	OR	99% CIca*	Missing data
AVAILABILITY OF WESTERN HEALTH CARE					
Antenatal Care in a government facility *	808/4349	560/1300	0.31	0.22-0.41	0.7%
EDUCATION					
Woman with post-secondary or higher education *	31/451	1330/5201	0.25	0.13-0.37	0.6%
Woman with junior high education or higher	729/3629	632/2023	0.57	0.43-0.72	0.6%
Woman with any formal education	1293/5349	68/303	1.21	0.71-1.71	0.6%
Household head with post-secondary or higher	91/832	1249/4716	0.36	0.24-0.48	2.4%
Household head with junior high or higher	730/3596	610/1952	0.58	0.44-0.72	2.4%
Household head with any formal education	1237/5143	103/405	0.99	0.65-1.33	2.4%
ECONOMIC CONDITION					
Household of good construction *	796/3729	566/1922	0.68	0.47-0.90	0.6%
Self-rated economic condition above community average	805/3673	558/1979	0.73	0.58-0.89	0.6%
Enough food last week	1081/4616	290/1065	0.85	0.63-1.06	0.1%
Household with safer water source	538/2340	824/3306	0.97	0.60-1.35	0.7%
Not living in hard to reach community	1203/5108	168/578	1.02	0.33-1.71	0.0%
Household using fuel other than charcoal or wood	365/1486	994/4161	1.10	0.73-1.48	0.7%
Living in urban community	457/1916	914/3770	1.17	0.53-1.81	0.0%
FAMILY RELATIONS					
Not verbally abused by partner in last 12 months *	344/1728	856/3267	0.72	0.57-0.86	12.2%
Does not report neighbours were verbally abused	143/731	1064/4285	0.76	0.57-0.95	11.8%
Not beaten by partner during last pregnancy	855/3760	347/1236	0.77	0.62-0.92	12.1%
Not beaten by partner in last 12 months	616/2807	588/2192	0.78	0.63-0.93	12.1%
Talked frequently with partner about pregnancy and delivery	847/3738	515/1904	0.80	0.65-0.96	0.8%
ENGAGEMENT WITH THE MODERN STATE					
Mother of a child with birth certificate *	465/2558	872/2967	0.55	0.42-0.69	2.8%
From community with electricity service	889/3920	401/1514	1.06	0.38-1.74	4.4%

* Variables included in the initial multivariate model

Table 2. Final multivariate analysis of variables associated with childbirth attended by a traditional practitioner

n= 4820	crude OR	adjusted OR	99% CIca	cl adj X^2mh
Attended government antenatal care	0.28	0.33	0.21 - 0.50	45.75
Post-secondary or higher education	0.23	0.34	0.21 - 0.56	31.12
Mother of a child with birth certificate	0.53	0.69	0.53 - 0.90	13.36
Not verbally abused by partner in last 12 months	0.72	0.80	0.65 - 0.99	7.58

cl adj X2mh= Cluster adjusted Chi square of Mantel-Haenszel

Household of good construction was also included in the initial multivariate model but it did not remain significant

Children with diarrhoea seen by traditional medical practitioners

Mothers or caregivers answered questions about treatment of the last episode of diarrhoea in

5,416 children who had consulted for their last episode of diarrhoea. In response to the question about where the child was taken first, the local pharmacy was the most common reported source of treatment: 41.8% (2266/5416) of cases. Traditional medicine was reported to be the first source of treatment in 1.6% (85/5416) of cases of diarrhoea. Among the 33.6% (1871/5416) of mothers who reported another source of treatment for the same episode, 29.3% (549/1871) said they used traditional medicine. Combining first and second sources of treatment, 11.3% (615/5416) of mothers reported they used traditional medicine for childhood diarrhoea.

Children of mothers whose last delivery was attended by a traditional medical practitioner were significantly more likely to be taken to a traditional medicine practitioner for common childhood illnesses (ORa 1.86, 99%CIca 1.24-2.48 X^2mh 28.9). Bivariate analysis (Table 3) showed children who had received BCG vaccination (as an indicator of access to Western medicine) were significantly less likely to be treated by a traditional medicine practitioner for diarrhoea (ORa 0.37 99%CIca 0.26-0.49).

Table 3. Bivariate analysis of associations with use of traditional medicine for childhood diarrhoea

Characteristic	Exposed	Non-exposed	Adjusted OR	99% CIca	Missing data
AVAILABILITY OF WESTERN HEALTH CARE					
Children received BCG vaccine*	532/5091	74/299	0.37	0.26-0.49	0.7%
EDUCATION					
Household head has post-secondary or higher education*	34/765	567/4550	0.37	0.20-0.54	2%
Household head has junior high education or higher	281/3217	320/2098	0.55	0.42-0.68	2%
Household head has any formal education	528/4811	73/504	0.77	0.52-1.03	2%
Mother/Caregiver has post-secondary or higher education	13/317	571/4788	0.44	0.14-0.73	5.9%
Mother/Caregiver has junior high education or higher	267/3085	317/2020	0.53	0.37-0.70	5.9%
Mother/Caregiver has any formal education	529/4777	55/328	0.69	0.38-0.99	5.9%
Father has post-secondary or higher education	39/831	525/4334	0.40	0.22-0.59	4.8%
Father has junior high education or higher	320/3622	244/1543	0.53	0.40-0.66	4.8%
Father has any formal education	528/4893	36/272	0.88	0.50-1.25	4.8%
ECONOMIC CONDITIONS					

From household using fuel other than charcoal or wood*	71/1048	539/4345	0.56	0.34-0.78	0.6%
From household with safer water source	186/2095	428/3307	0.69	0.47-0.91	0.4%
From household with good quality construction	332/3351	282/2051	0.72	0.51-0.93	0.4%
Not living in hard to reach community	523/4832	92/593	0.79	0.35-1.23	0.0%
Living in urban community	139/1529	476/3896	0.81	0.43-1.19	0.0%
With enough food last week	452/4091	133/1031	0.88	0.62-1.14	5.6%
From household considering their financial situation as above average for the community	370/3394	242/2004	0.92	0.68-1.17	0.5%
FAMILY RELATIONS					
Mother not beaten by partner during last pregnancy*	309/3073	158/1070	0.67	0.48-0.87	23.7%
Mother not beaten by partner in last 12 months	214/2225	253/1922	0.73	0.53-0.93	23.6%
Mother not verbally abused by partner in last 12 months	115/1232	351/2911	0.78	0.56-1.00	23.6%
Mother does not report that neighbours were verbally abused	43/497	426/3659	0.82	0.43-1.20	23.4%
Mother talked frequently with partner about pregnancy & delivery	342/3053	174/1592	1.06	0.79-1.33	14.4%
ENGAGEMENT WITH THE MODERN STATE					
Child has a birth certificate*	189/2539	418/2799	0.48	0.34-0.61	1.6%
From community with electricity service	328/3700	246/1524	0.55	0.33-0.78	3.7%

* Variables included in the initial multivariate model

Variables in the initial multivariate analysis model included: children who had received BCG vaccine, household head with post-secondary studies or higher, households using fuel for cooking other than charcoal or wood, children of a mother not beaten by her partner during her last pregnancy, and children with a birth certificate.

Table 4 shows the final model of the multivariate analysis of variables associated with children with diarrhoea being taken to a traditional medicine practitioner. Table 5 shows a clear, if non-linear, trend between higher educational levels among women and a lower reliance on traditional medicine for childbirth and diarrhoea.

Table 4. Final multivariate analysis of variables associated with children being taken to a traditional medical practitioner for treatment of diarrhoea

N=5180	Crude OR	Adjusted OR	99% CIca	cl adj X^2mh
Household head has post-secondary higher education	0.32	0.39	0.26 - 0.59	34.6
Children with BCG vaccine	0.36	0.46	0.29 - 0.72	20.1
Child with birth certificate	0.47	0.56	0.42 - 0.75	27.3
From household using fuel different of charcoal or wood	0.51	0.63	0.43 - 0.92	10.01

cl adj X2mh= Cluster adjusted Chi square Mantel-Haenszel

Mother not beaten by partner during last pregnancy was also included in the initial multivariate model but it did not remain significant

Table 5. Trend analysis of use of traditional medicine and education level of the women

Education level and childbirth attended by traditional medical practitioner					
Woman	No education	Elementary	Junior High	Senior High	Higher education
Traditional medicine during childbirth	67	564	259	439	31
Other for childbirth	233	1156	607	1873	420
Total	300	1720	866	2312	451
OR		1.85	0.97	0.55	0.25
Mantel-Haenszel χ^2 for trend=135.2 1df					

Education level and diarrhoea attended by traditional medical practitioner					
Mother or care giver	No education	Elementary	Junior High	Senior High	Higher education
Traditional medicine for diarrhoea	55	262	99	155	13
Other for diarrhoea	271	1430	706	1808	304
Total	326	1692	805	1963	317
OR		1.01	0.81	0.53	0.44
Mantel-Haenszel χ^2 for trend=77.2 1df					

DISCUSSION

One in every four women (24.1%, 1371/5686) in Cross River State had her last delivery attended by a traditional practitioner and one in every ten children (11.3%, 615/5425) was taken to a traditional practitioner to treat their last case of diarrhoea. Use of traditional medicine was convincingly associated with non-use of Western medical services, lower levels of education, increased risk of family violence, and lack of engagement with the modern state as reflected in children not having birth certificates. Our findings indicate that any enquiry into the effectiveness of traditional medicine should take careful account of these covariates which could be determinants of health in their own right.

This is one of few population-based representative studies of the use of traditional medicine and associations with this behaviour. Our data probably underestimate the actual use of traditional medicine as people may hide their preferences for traditional medicine in the face of stigma.[28] Mothers in our study rarely spontaneously mentioned traditional medicine when asked where they took a child with diarrhoea, but more often mentioned it when encouraged to say where else they had taken the child. This may reflect stigma associated with the use of traditional medicine.

From a cross-sectional study, one cannot draw firm conclusions about causal relations. For example, we cannot say that increased education *caused* decreasing use of traditional medicine. But the association between lower education and more use of traditional medicine would make it difficult to measure the full impact of traditional medicine on health, because education itself is such a strong determinant of health status and health reporting.

Pharmacies were the first resource for treating childhood diarrhoea in Cross River State (41.8%). The 2010 malaria indicator survey found a similar result for childhood fever,[29] a pattern of self-medication that is well recognised in Nigeria.[18, 30] Our finding that women rarely mentioned visiting traditional practitioners for treatment of children with diarrhoea when first asked, but revealed these visits when asked about any other sources of treatment, is in line with findings from two studies in Ghana.[31, 32] This suggests that it is important to allow survey respondents to mention more than one source of care if they are to disclose use of traditional medicine. In this study, we did not establish whether choice of Western medicine preceded or followed traditional medicine, although this could be the focus of further research.

Although other authors have reported an association between urban residence and using formal health facilities for antenatal care and delivery,[33, 34] we did not find a significant association between use of traditional medical practitioners for childbirth or treatment of childhood diarrhoea and residence in rural or hard to reach communities. This suggests that traditional medicine is commonly used in all types of community in Cross River State. A study in Aba City, Nigeria, interviewed 19 urban women seeking treatment from rural traditional medicine practitioners of different ethnicity and found their reasons for going to these traditional practitioners included failure of urban health services to provide a cure, beliefs about the cause of their condition, the

nature of their condition, and a wish to maintain secrecy.[35]

Although affordability has been recognized as an important factor associated with traditional medicine, in Nigeria treatment choice involves cultural factors as well as cost of services.[36] In our multivariate analysis of use of traditional medicine in childbirth, socio-economic variables did not remain as significant associations in the final model. Onwujekwe and colleagues found no significant difference between low and high socio-economic status and the quality of the providers used for malaria treatment in southeast Nigeria.[37]

We found a significant association between experience of family violence and childbirth attended by traditional medicine practitioners. We cannot conclude that there is causal relation, nor in which direction it might be. Other authors have reported a strong influence of family and relatives in the decision about where to seek pregnancy and childbirth care.[38] Traditional medicine is relatively low cost compared with Western health care; cost-related decisions could be a plausible explanation for what might be an indirect association with family violence. Families where a woman is subjected to violence might also be unwilling to pay for her to have more expensive Western medical care in pregnancy and childbirth.

In our analysis, children with birth certificates - a marker of engagement with modern state institutions - were more likely to be taken to government health facilities for treatment of diarrhoea. In an analysis based on the same survey, children with birth certificates were also more likely to have educated parents, to have mothers who delivered in a government health facility, and to live in less poor households.[15]

Our striking gradient between levels of education and reliance on traditional medicine for both childbirth and childhood diarrhoea agrees with the findings of other studies in Nigeria.[34, 38, 39] Western education is often accompanied by beliefs and values that neglect and sometimes condemn traditional practices as Western-trained educators strive to "educate and convince women to dispel myths which limit their use of orthodox care".[40, 41] The negative effects of forced Western education health in Indigenous people has been a matter of discussion in North America.[42]

Our findings are compatible with a "transitional society where both traditional and modern medicine are employed and where the choice between them is determined by belief systems which are themselves in the process of change".[43, 44] We believe that use or abandonment of traditional medicine is part of the transition from traditional to modern, a transition unevenly mediated through education, which influences health status in complex ways.[45] Not least of these influences are the economic opportunities and incomes that come with modern education. It seems plausible that people using traditional medicine face harsher conditions of life (less education, less access to modern state machinery, less use of Western health services, and low socioeconomic status) producing, interacting with, and possibly multiplying health burdens.[42] These variables should be included as possible covariates in analyses of the efficacy of traditional medicine.

Our study was a secondary analysis of data from a survey not designed to answer the question of who uses traditional medicine. Future studies specifically focussing on the use of traditional medicine should include intercultural dialogue with traditional practitioners as part of the design.[46, 47] This dialogue could help to refine the research question and identify factors that

influence use of traditional medicine.

CONCLUSIONS

Availability of Western medicine was a factor in the abandonment of traditional medicine, but education, family relationships and linkages with government institutions also played important roles. The prominence of education suggests complex connections between the use of traditional medicine and cultural transition.

Given its continued importance in countries like Nigeria, formal studies to assess effectiveness of traditional medicine are much needed to optimize health care services and to improve health outcomes. Epidemiology applied to this traditional knowledge should be based on intercultural dialogue, better recognition and documentation of the social, economic and cultural factors in health outcomes, and should take into account the role of Western education in acculturation and the uneven loss of traditional medicine practices.

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CONTRIBUTORS

IS designed the study and supported fieldwork in Cross River; he also analysed the data and drafted the manuscript. GZ supervised the data analysis, and contributed to the manuscript. NA designed the overall study in which this is embedded, and contributed to data analysis and write-up. IS, GZ, and NA had access to the data and all authors had final responsibility for the decision to submit for publication. None of the authors received payment for the preparation or publication of the manuscript. All authors read and approved the final manuscript.

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DATA SHARING

No additional data available

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Online Supplementary Material 1

N2.2- Household Questionnaire

Part A: General Household information on socio-economic status, housing, water supply, sanitation, and hygiene *<To be obtained from the head or the senior most female or male respondent available in the household at the time of visit.>*

a. <Note name of the village/settlement>

<Use a separate page of the Bhopal book for each visited house irrespective of whether interviewed or not. In case the household was not interviewed because of reasons such as locked, no eligible person to interview or language problem, note the reason on the corresponding page of the Bhopal book for this household and move to the next house.>

Hello and greetings,
My name is _____. We are with a group called CIET that is conducting household interviews on behalf of the State Ministry of Health and the Local Government Authority. Our team members are visiting all the households in this community to hear citizens' views about health care and services, especially for women and children 0-36 months of age. With your permission we will also measure of the upper arm of your children 0-36 months of age to assess how well they are growing. The information you give us can help the Ministry and the LGA to plan and provide better health services. Your answers will be confidential; we will not write your name. You don't have to answer any question you prefer not to and you can stop the interview at any time. It will take about 20 minutes. [Pasted on back of Bhopal book]

b. Have I explained adequately the purpose of the survey? *<Yes/No>*
c. Do you understand that you do not have to answer any questions you do not wish to and that you can stop the interview at any point? *<Yes/No>*

<Only proceed with the interview if answer to b and c is yes. If the answer to either of these questions is no, try to explain the purpose again.>

d. Do you agree to participate? *<Yes/No><If No, write refused; thank the respondent and move to the next household>*

1. How many people including you live in this household (excluding visitors/guests)?
2. How many males are there in this household?
3. Starting with the youngest, please tell me the age of each male. *<Circle all males up to 3 years of age. >*
4. How many females are there in this household?
5. Starting with the youngest, please tell me the age of each female. *<Circle all females up to 3 years of age and underline all women aged 15-49 years (CBAs).>*

<Issue a sticker slip for each circled child and CBA to the accompanying female interviewers before proceeding further. Write household code and age of the child or CBA on each sticker. Paste the sticker on the corresponding page of MCQ register where the information on CBA or child is being recorded.>

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<If there are no children under 36 months of age and women aged 15-49 years identified in the household, then end the interaction and go to the next household.>

<In case, the information on eligible children and CBA cannot be obtained due to non-availability of the respondent complete the GHQ and record the reason for their unavailability on the corresponding page of the MCQ registers>

6. *<Note the sex of the respondent>*
7. What is your relationship with the head of the household? *<Write 'self' or relationship, if self skip to* ***Q10****.>*
8. Is the head of the household a male or a female? *<male/female>*
9. What is the education of the household head? *<write highest completed class, diploma or degree/Islamia or Arabic/no education>*
10. What is the occupation of the main household breadwinner? *<Designation and organisation if employed/nature of work if self employed>*
11. What is the main language you speak at home? *<write exact language>*
12. Did you have enough food in this household during the last week? *<yes/no/don't know>*
13. Compared with other households in the community, would you say your household financial situation is above average, average, or below average?
14. How many rooms are there in this household, excluding the kitchen, bathroom and store?
15. Is the kitchen/cooking area inside the main living area or separate? *<Separate/inside living area>*
16. Is the kitchen/cooking area separate from the sleeping area? *<separate/inside sleeping area>*
17. What type of fuel do you mostly use for cooking?
    <Gas, wood, charcoal, kerosene, electric, saw dust, other (specify), none>
18. How many members of the household smoke inside the house? <write number of members or 0 >
19. Do you have treated or untreated bed nets in this house?
    <treated/untreated/both/none/don't know. If none write N/A against ***Q20****>*
20. From where did you get these bed nets? *<Bought from the market/provided by the government/don't know>*

Now some questions about the toilet in your household

21. Where do the household members go for defaecation? *<use a latrine within the household/ use a latrine outside/ within household but no latrine/ outside open field or bush>*
22. What type of toilet do you have in the household? *<Use laminated card. If a toilet exists write N/A against* ***Q23****>*
23. (If no toilet) What is the main reason for not having a toilet?

Now some questions about your drinking water

24. What is the main source of your water for drinking? *<use the laminated card>*
25. How far away is that source from your house? *<write the distance and the unit. If the source is within the household write within the household. >*
26. How do you treat or purify your drinking water?
27. May I see the container in which you store drinking water? *<yes/no. If NO, write N/A against* ***Q28-Q30*** *>*
28. *Observe and note if the container is covered <yes/no>*

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29. *Observe and note if the container is clean <yes/no>*
30. *Observe and note if the container is raised from the ground level <yes/no>*

<Record the following information about the household by direct observation. Male interviewers to coordinate with female interviewers for observation if not allowed in the household>

31. *<Note the type of house construction> <zinc roof and cement or concrete walls/ zinc roof and mud walls plastered with cement/ zinc roof and mud walls/ thatched roof and mud walls plastered with cement/ thatched roof and mud walls).*
32. *Note the ventilation arrangement in the house <windows, ventilators, no system>*
33. *Note if there is garbage present in the household or around the doorstep<yes/no>*
34. *Note if there is sewage water present in the household or around the doorstep<yes/no>*
35. *Note if there are excreta present in the household or around the doorstep<yes/no>*

Thank you for your time. <Close your interview book.>We will be returning after a couple of months and bringing together groups to discuss the information that has been collected in your LGA during this survey. Thanks again.

Online Supplementary Material 2

Social audit on integrated management of childhood illnesses
Community Profile

*<Collect the following information about each village/settlement visited. Fill a separate form for each village/settlement visited either by **direct observation where possible** or by interviewing a key informant. The key informant may be a community leader, a teacher, a social worker/NGO activist, or any other knowledgeable person from the community. More than one person can be interviewed for different pieces of information.>*

Name of the primary community: _____ Code:_____

Name of the settlement: _____ Code:_____

Name of LCA: _____ Code:_____

Name of QCA: _____ Code:_____

Date of visit: _____

OBSERVATIONS

1. Condition of access road to the settlement:
   A- Poor (dirt road)
   B- Medium (flat gravel, stone)
   C- Good (paved)

2. Condition of road within the settlement:
   A- Poor (dirt road)
   B- Medium (flat gravel, stone)
   C- Good (paved)

3. Observe if there are large amounts of garbage piled in the streets?
   Yes □ No □

4. Observe if there are large amounts of human/animal excreta in the streets?
   Yes □ No □

5. Observe if there are large amounts of stagnant water/sewage in the streets?
   Yes □ No □

Assalam-o-A laikum, my name is _____. We are with a group called CIET that is conducting a survey in your LGA in collaboration with the State Ministry of Health and local government authority to hear peoples' views of health services. We are conducting household interviews in your community and as a knowledgeable person in the community we would appreciate if you could help us with some general information about your community. The information would help state Ministry of Health and Local Government Authorities to understand better the health needs of the communities and in turn better plan their services accordingly. The information would be completely confidential and no

names would be mentioned. You do not have to answer any question you do not want to and can stop the interview at any stage. It will take about 15 minutes.

a. Have I explained adequately the purpose of the survey? Yes □No □

b. Do you understand that you do not have to answer any questions you do not wish to and that you can stop the interview at any point? Yes □No □

<Proceed ONLY if the response to these two questions is "YES". If the answer to any of these questions is "NO" explain the purpose again.>

c. Do you agree to participate? Yes □No □

<Proceed only if the respondent agrees to participate. If not identify some other key informant who can provide the information. In case the profile was not filled at all write reason for the same.>

ELECTRICITY

6. Is there electricity in this town? Yes □No □ *<skip to Q8>*

7. How many hours of power are provided per day (average)? _____hr/day

8. How many private generators are there in this community? None □ Few □ Many □

GARBAGE REMOVAL

9. Is there a government system for removing garbage from this community?
Yes □No □ *<skip to Q11>*

10. If yes, how frequently is the garbage removed from the community? *<Write the period and unit as specified by the respondent. Skip to Q12>* _____
\

11. Is there another system for removing garbage from individual households in this community?
Yes □No □

12. How else do residents deal with their garbage?

_____

_____

WASTE WATER AND SEWAGE REMOVAL

13. Is there a government system for removing waste water and sewage from this community?
Yes □No □ *<skip to Q15>*

14. If yes, what is the system? (*Confirm the system by direct observation)*
All covered or piped drains □
Open/partly covered proper drains □

Partly proper, partly open drains □
All open drains □

DRINKING WATER SUPPLY

15. What is the main source for drinking water in the settlement?
- A- Taps within the households □
- B- Community taps □
- C- Borehole within the households □
- D- Community borehole □
- E- Well within the household □
- F- Community well □
- G- River/Spring □
- H- Any other source (specify): _____

16. When this fails, what is the second source?
- A- Taps within the households □
- B- Community taps □
- C- Borehole within the households □
- D- Community borehole □
- E- Well within the household □
- F- Community well □
- G- River/Spring □
- H- Any other source (specify): _____

17. How would you describe the quality of underground water in this community?
Normal □ With some taste □ Salty □ Bitter □

ACCESS TO CHILD HEALTH CARE

18. List all the health facilities ***within the settlement*** including hospitals <*Include government, private, NGOs, traditional healers.*>

Name	**Type***	**How functional is the facility?#**	**Facilities and Services** <*write yes or*			
			Immunization	**Malaria Rx**	**Antibiotics**	**ORS**

**1. Government 2. Private qualified 3. Private unqualified 4. NGO 5. Traditional*

Fully, partially, not at all

*I*9. List the information about following government health facilities in relation to this settlement.
<*Skip those already included in Q18*>

Arrangement	Name and address	Distance (km)	Mode of transport	Cost on transport (Round trip)
Any nearest				
Nearest providing Immunisation				
Nearest providing Anti-malarial Rx				
Nearest providing antibiotics				
Nearest providing ORS				
Nearest general or tertiary* care hospital				

*Specialist hospital or federal medical centre

20. Are there any churches that provide child health care such as immunization or treatment of childhood illnesses in this settlement? Yes □No □ <*skip to Q22*>

21. List all such churches. <Ask for names and addresses to find them so they can be visited>

Name	Address

22. Are there any other organizations providing child health care such as immunization or treatment of childhood illnesses in this settlement? Yes □No □ <*skip to Q24*>

23. List all such organizations <ask for names and where to find them so they can be interviewed>

Name	Address

24. Is there a chemist/patent medicine seller in this settlement? Yes □No □

IMMUNISATION SERVICES

25. Where do people in this community usually take their children to be immunised? <*Write exact name and address of the facility.*>

_____

_____

26. How far away is this facility from the community? <*write distance in km from centre of the community. If within community write "within community"*>

_____

27. How do people usually travel to this facility?

_____

_____

28. How much time does it take to reach the facility by this means (one way)? _____

29. How much does it cost to travel to this facility by this means (round trip)? _____*Naira*

30. Apart from Polio Campaign/days, how frequently does any vaccination team/person visit this community to immunise children? <*Never or write the period and unit as specified by the respondent. If never go to Q32*>

_____

31. When was the last such visit? <*Write the period and unit as specified by the respondent*>

_____

32. When was the last Polio Campaign Day in this community? <*Write the period and unit as specified by the respondent*>

_____

33. How many polio campaign days have you had in this community in the last 12 months? _____

34. When was the last Measles vaccination Campaign in this community? <*Write the period and unit as specified by the respondent*>

_____

COMMUNITY ORGANIZATION

35. Is this settlement a member of any local area or village development committee?
Yes □ No □ <*skip to Q39*>

36. Is this committee active? Yes □ No □

37. How frequently does this committee meet? _____

38. When was the last meeting? _____

39. Is this settlement a member of any local area or village health committee?
Yes □No □ <*skip to Q43*>

40. If yes is this committee active? Yes □No □

41. How frequently does this committee meet? _____

42. When was the last meeting? _____

43. What is the average monthly income from all sources of an average household in this community?

_____ Naira

44. Contact name, number, and address of Community Leader, Head or Chief:

_____

_____

_____

N2.2. MCQ – 5 July 2011

Online Supplementary Material 3

Household questionnaire - Part B: Maternal and child health

a. Note the household code <Note the GHQ code and paste the sticker.>
b. Have I explained adequately the purpose of the survey?
c. Do you understand that you do not have to answer any questions you do not wish to and that you can stop the interview at any point?
<Only proceed with the interview if answer to b and c is yes. If the answer to any of these questions is no, try to explain the purpose again.>
d. Do you agree to participate? *<Yes/No><If No, write refused. Thank the respondent. Move to the next mother/caregiver or to the next household.>*

Section A: Woman section

1. What is your age? *<Ask from the respondent.* ***Do not copy from the household slip.*** *Write age in completed years>*
2. What is your education? *<write highest completed class, diploma or degree/ Islamia or Arabic/no education>*
3. What is your marital status? *<Single/Married/Co-habiting/Widow/Divorced/Separated>*
4. Did you have enough food for yourself during the last week?
5. Do you have any income of your own?
6. Who decides how to spend this income?
7. What danger signs during pregnancy, before starting labour, do you know of?
8. What danger signs during childbirth do you know of?
9. How often do you speak to your husband or partner about issues related to pregnancy and childbirth? *<Never/Rarely/Sometimes/Often>*
10. How many children do you have? *<write 0 or the exact number of children>*
11. How many times have you been pregnant? *<write 0 or the number of times pregnant> <If 0, go to section on DV>*
12. **Have you been pregnant in the last two years?** *<If yes, exclude a current pregnancy> <If no, write N/A for Q13-Q30 and go to Q31>*
13. For your last pregnancy, after how many months of pregnancy did you reduce your routine heavy work? *<Write 'never' or months of pregnancy>*
14. How many government antenatal checkups did you have during this last pregnancy? *<Write none or number of checkups>*
15. How many times did you go anywhere else or see anyone else for care during your pregnancy?*<Write 'none'/number of checkups>*
16. How many times did you get your urine tested during pregnancy? *<write none or number of times>*
17. Did anyone tell you that you had anything wrong with your urine during that pregnancy?
18. How many times did you get your blood pressure checked? *<write none or number of times>*
19. Did anyone tell you that you had high blood pressure during that pregnancy?
20. Did you get swelling of the face or hands?
21. During this last pregnancy did you have fits or convulsions?
22. What was the outcome of your last pregnancy *<live baby, miscarriage, abortion, stillbirth>*
23. In what month and year did you have your last delivery? *<write month and year of last*

delivery>

24. Where did you deliver? *<Write the type of facility from laminated card >*

25. Who conducted the delivery? *<Write the type of person from laminated card>*

26. Did you have a caesarean section or was your vagina cut or had a tear when you gave birth? *<CS/ vagina cut/vaginal tear/neither >* ***<If neither write NA against Q27>***

27. Did the wound open up afterwards or become infected?

28. Did you develop high fever within six weeks after this delivery?

29. Did you develop foul smelling discharge from vagina within six weeks after this delivery?

30. How long after the delivery did you have a check-up on your health by anyone? *<Write never or period and units as mentioned by the respondent>*

31. **How many children do you have who are 3 years or less than 3 years of age? *<Write number/none><If none, write N/A for Q32-Q98. Go to section on domestic violence >***

32. From where have you heard about immunizations for children? *<write 'nowhere' or source/person>*

33. Do your neighbours think it's worthwhile to immunize children?

34. Do you think it's worthwhile to immunize children?

35. Have you discussed in the family about immunization for children?

36. What do you think is the main cause of diarrhoea in children?

37. If a child has diarrhoea, should you give him/her fluids other than milk, such as water more than usual, the same as usual or less than usual? *<more than usual, the same as usual or less than usual>*

38. If a child has diarrhoea, should you give him/her food including breast milk /milk more than usual, the same as usual or less than usual? *<more than usual, the same as usual or less than usual>*

Section B: Child section

I will now ask you about your child/ren 3 years of age or less.

39. Note sex of the child.

40. What is the date of birth of the child? *<record the date of birth as DD/MM/YY. If date of birth not available help mother to give you exact age in months with reference to the child's last birthday>*

41. What is your relationship to this child? *<write relationship of the respondent to the child.>*

42. What is the education of the mother of this child? *<write highest completed class, diploma or degree/ Islamia or Arabic/no education>*

43. What is the education of the father of this child? *<write highest completed class, diploma or degree/ Islamia or Arabic/no education>*

44. Who usually takes care of this child? *<write relationship of the caregiver to the child>*

45. Would you say this child is small for his/her age, about right for age, or big for age?

46. During the malaria season how often does this child sleep under a bed net? *<always/mostly/sometime/never/don't know. If never write N/A against **Q47**>*

47. Is this bed net treated?

Breastfeeding

48. Did you feed this child the colostrum (first milk) after birth? *< use local term for colostrum>*

49. At what age (months) did you stop breast-feeding this child? *<Age in months/still breastfed/never breastfed>*

50. At what age did you give this child other liquids such as water/pap, akamu, ogi/herbal drink? *<Days/months/not yet>*

51. At what age did you give this child other solid foods? *<Days or months/not yet/don't know>*

Immunisation

52. Who decides / decided about immunizations for this child? *<write relationship of the decision maker with the child>*

53. Has this child received BCG injection given at birth into the left arm? *<Use local term to explain BCG>*

54. How many times has the child received DPT injection to prevent him/her from contracting Diphtheria, Purtussis and Tetanus, that is given into the right thigh at one month interval? *<'none' or number of times or completed course>*

55. How many times has the child received Hepatitis-B injection to prevent him/her from contracting Hepatitis B, that is given into the left thigh at birth and then at six weeks and 14 weeks of age? *<'none' or number of times or completed course>*

56. Has this child received the nine-month injection for Yellow fever given into the right arm at nine months? *<Use local terms to explain Yellow fever>*

57. How many times in the last 12 months has this child received polio drops? *<Use local terms to explain Polio>*? *<Write none or number of times>*

58. Has this child received the nine-month injection for measles given into the left arm? *<Use local terms to explain Measles> <If no or don't know, go to* ***Q60****>*

59. At what age did the child get this measles injection? *<write the age in exact months when the child had the measles vaccination>*

<If the child has not received any vaccination write N/A against ***Q60****>*

60. Did you have to pay at the health facility (in cash or kind) for any vaccination? *<No/Cash/Kind/Both>*

<If the child is more than nine months old AND has received the BCG, complete DPT and complete Hepatitis-B, measles and yellow fever injection and some polio drops, write N/A against ***Q61.*** *Also write the same if the respondent doesn't know about the immunization status of the child.>*

61. What is the main reason why this child has not received any/all immunizations

Diarrhoea

62. When did this child last suffer from diarrhoea? *<write never or how long ago, in days, weeks or months. If never go to* ***Q72****>*

63. How many days did this last episode of diarrhoea last?

64. Was there any blood in the stool?

65. During this last episode of diarrhoea, did you give the child fluids (other than milk, such as water) to drink more than usual, same as usual or less than usual? *<more than usual, same as usual or less than usual>*

66. During this last episode of diarrhoea, did you give the child food (including breast milk/milk) more than usual, same as usual or less than usual? *<more than usual, same as usual or less than usual>*

67. During this last episode of diarrhoea, did you give the child sugar salt solution or ORS? *<sugar salt solution/ORS/none/don't know>*

68. During this last episode of diarrhoea, did you give the child any medicine to stop diarrhoea?

69. Where, if anywhere, did you seek treatment for the child for the diarrhoea? *<Write type of health facility from the laminated card corresponding to the response. If nowhere/home write N/A for* ***Q70. Go to Q71****>*

70. Did the provider or facility provide ORS for the child?

71. What other treatment did you give the child for the diarrhoea?

Severe fever

72. When did this child last suffer from severe fever? *<Write never or how long ago, in weeks or months. If never go to **Q77**>*
73. How many days did this last episode of severe fever last?
74. Where, if anywhere, did you seek treatment for the child for this last episode? *<Write type of health facility from the laminated card corresponding to the response. If nowhere/home write N/A for **Q75. Go to Q76**>*
75. What medicines did they prescribe for the severe fever?
76. What other treatment did you give the child for the severe fever?

Acute Respiratory Infection (ARI)

77. During last one year, how many times did this child suffer from an illness with fever, cough and rapid breathing? *<write never or number of times. If never go to **Q82**>*
78. When did this child last suffer from an illness with fever, cough, and rapid breathing? *<Write how long ago, in days, weeks or months.>*
79. How many days did this last episode of illness last?
80. Where, if anywhere, did you seek treatment for the child for this last episode? *<Write type of health facility from the laminated card corresponding to the response.>*
81. What other treatment did you give the child for this illness?

Measles

82. Has this child ever had measles? *<If NO, write N/A against **Q83 and Q84**>*
83. How old was the child when she/he had measles? *<write the age in exact months when had measles>*
84. How much did it cost you for the medicines and treatment for the measles? *<write 0 or exact amount in Naira>*

Experience with health services

85. Who decides about where to seek treatment for this child in case of illness? *<Write relationship of decision maker with the child>*
86. When did you **last** seek treatment for this child for illness? *<Write how long ago, in days, weeks or months.>*
87. What type of health facility or provider was it? *<use the laminated card>*
88. What is the name of that health facility or provider? *<Write the full name and address of the health facility or provider.>*
89. How much did you have to pay for travel to and from the facility or provider (round trip)?
90. How long did you have to wait to be seen by the doctor or health worker? *<record answer as hours or minutes>*
91. Did the doctor or health worker explain to you about the child's condition fully, partially or not at all? *<fully, partially, not at all>*
92. How many of the medicines prescribed did the provider or facility provide you with? *<all/some/none>*
93. How much did you have to pay for the medical treatment at the health facility or to the provider? *<write 0 or exact amount in Naira>*
94. How much did you have to pay for medicines or tests outside the facility?*<write 0 or exact amount in Naira>*

<If the child is male, go to Q97>

95. Has this child had her FGM/circumcision/flesh removed? *<If no/don't know or refused go to **Q97**.>*
96. When was this done? *<write the age in exact months.>*

97. Does this child have a birth certificate? May I see it? *<has certificate and seen/ has*

certificate but not seen/ does not have certificate/ unsure if has a certificate>

98. Now we would like to assess the nutritional status of this child. For this we need to measure his/her upper arm. May we measure his/her arm? *<If Yes, issue a MUAC card for that child and advise the caregiver to take or send the child to the team member measuring MUAC>*

<Go to the next 0-36 months old child of the same mother/ respondent and ask from ***Q39-Q98****. If there is no other 0-36 months old child with this mother/care giver, continue with the* ***section on domestic violence.***

Section C: Domestic Violence

<Before these questions on domestic violence, check to ensure that you and your respondent still have privacy. If there are children around, who are old enough to repeat what is being said, please ask the respondent to send them away. ***If you cannot conduct this part of the interview without being overheard, do not continue****>*

As we both know domestic violence is all too common. But the real size of the problem is not well known because many women keep silent about what is happening to them. I am also a woman and I know how hard it is to talk about this. I would like to ask you some questions about domestic violence. You don't have to answer these questions if you don't want to and you may ask me to stop at any time. Your answers will be kept strictly confidential.

99. How common is domestic violence in your community? *<very common, common, not common, does not happen>*
100. Have any of your neighbours ever suffered mental or verbal abuse (such as being yelled at, bad names, bickering, criticizing) by a household member?
101. Have any of your neighbours ever suffered physical abuse (such as beating, kicking, slapping) by a household member?

I am now going to ask you some questions about your own experience. As you have mentioned, domestic violence is common in your community, and some of your neighbours have suffered. I am not surprised to hear this. I myself know of a case of domestic violence<mention something about it>. I also know how hard it can be to talk about this. Please remember that anything you tell me is strictly confidential; nobody will be able to find out what you have told me.

102. In the last year have you suffered mental/verbal abuse (such as bad names, bickering, criticizing, being shouted at) from any household member?
103. In the last year, have suffered mental/verbal abuse (such as bad names, bickering, criticising, being shouted at) from your husband or partner?
104. In the last year, have you suffered physical abuse (such as beating, kicking, slapping) by any household member?
105. In the last year, have you suffered physical abuse (such as beating, kicking, slapping) by your husband or partner?
106. In your last pregnancy, did your husband or partner physically abuse you (like beating, kicking or slapping you)?
107. Have you ever felt afraid of your husband or partner?
108. Why?

Thank you very much for your time today. <Close your register>

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Title page
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 14
Study size	10	Explain how the study size was arrived at	Page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 7
		(*b*) Describe any methods used to examine subgroups and interactions	Page 7
		(*c*) Explain how missing data were addressed	Page 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 5
		(*e*) Describe any sensitivity analyses	Page 7
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 8
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 8
		(b) Indicate number of participants with missing data for each variable of interest	Results section
Outcome data	15*	Report numbers of outcome events or summary measures	Pages 9 and 11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Pages 9 and 11
		(*b*) Report category boundaries when continuous variables were categorized	NA
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 13
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 14 to 16
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.