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The social shaping of childhood vaccination practice in rural and urban Gambia

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Improving childhood vaccination coverage is a key health policy objective in Africa, and as availability increases, it will depend on addressing issues of demand and timely schedule completion. This paper explores vaccination demand in urban and rural areas of The Gambia as shaped by prevailing local vaccination cultures (comprising maternal knowledge and understandings, socio-cultural contexts and interactions with health providers). A survey of 1600 mothers constructed on the basis of prior ethnography finds a high level of social demand for vaccination, based on lay theories of the general value of immunization in complementing traditional child protection practices. For most rural mothers, strong social networks encourage routine clinic attendance and vaccination 'default' arises only through day-to-day problems and contingencies. However, more pervasive patterns of schedule non-completion are found amongst poorer urban mothers, including recent immigrants, who experience social exclusion at infant welfare clinics. These findings point to the need for health education dialogue grounded in mothers' own understandings and for particular policy attention to improving the clinic experiences of vulnerable social groups in rapidly expanding urban areas.

Key words: vaccination, demand, culture, knowledge, Gambia, immunization, inequality

Introduction

Much policy discussion and research addressing vaccination coverage in Africa focuses on issues of supply and access. With increased availability, however, attaining still higher coverage will require more focus on demand-side issues. Why do some parents not completely vaccinate their children on time even when services are available? What is the nature of vaccination demand, and how sustainable is it? Here, we report on a study which addresses these questions in The Gambia, where levels of vaccination coverage are high by African standards (WHO/UNICEF 2004).

Following previous studies (Nichter 1995; Streefland et al. 1999), we define vaccination demand as a situation where people desire and seek vaccination for their children. As a basis for vaccination uptake, this can be distinguished from passive acceptance or compliance, for instance 'by a public which yields to the recommendations and social pressure, if not prodding, of health workers and community leaders' (Nichter 1995). Existing literature further distinguishes between 'active demand' ('adherence to vaccination programs by an informed public which perceives the benefits of and need for specific vaccinations') and social demand, based on a perception of general benefits from vaccination or clinic attendance, or general trust in biomedicine (Streefland et al. 1999). Equally, vaccination non-uptake can take a variety of forms: it may reflect non-acceptance – refusal to go, or resistance grounded in a questioning of the need for vaccination – or a willingness but inability to go (Streefland et al. 1999). In this paper, we use the term 'default' to describe all these categories of non-uptake, including also the further category of significant lateness on the recommended schedule. We explore the relevance of different types of demand and default in Gambian settings.

Many studies have related vaccination demand and default to individual behaviour and dispositions. Some examine parental knowledge, attitudes and beliefs – including both mother's general educational level (Onuoha 1981; Cleland and Van Ginneken 1988; Bicego and Boerma 1993), and their perception and knowledge of vaccinations (Onuoha 1981; Helman and Yogeswaran 2004). Others link these individual dispositions with other social characteristics such as income, family size, ethnicity, social isolation and migrant status (Hanlon et al. 1988; Heggenhougen and Clements 1990; Eng et al. 1991; Gage et al. 1997).

A contrasting anthropological literature, founded largely on qualitative ethnographic study, shifts the focus from people's dispositions to the social and cultural relations that influence vaccination decisions, emphasizing how individual practices interplay with community processes (Streefland et al. 1999). This anthropological work finds vaccination uptake and default – whether by particular parents, communities or social groups – to turn on

(a) how vaccination engages with existing knowledge, aetiologies and perceptions of disease, and (b) specific socio-cultural contexts and experiences of interaction between people and health care providers, which together constitute 'local vaccination cultures' (Streefland et al. 1999). Rapid urbanization in Africa is creating new socio-cultural contexts for people's engagement with vaccination. While some studies explore vaccination demand and uptake in urban settings (e.g. Cutts et al. 1991), a comparative perspective across rural and urban areas can discern the significance of urbanization to vaccination cultures.

This paper considers the nature of local vaccination cultures in the Gambia and how their significance varies for those facing different social circumstances: whether relating to social characteristics and their transformation in urban migration, or to the more contingent problems that arise in day-to-day life. Based on the results of a survey constructed on the basis of prior ethnographic study, which itself also informs analysis, the paper addresses the relevance of both individual parental characteristics and community processes, and discerns the significance of these issues for policy approaches to improving immunization uptake.

Methods

Population and sampling

Areas of The Gambia were chosen where there was good immunization access linked to a strong government system of Infant Welfare Clinics (IWC) at health centres and outreach posts, reinforced with infrastructural support from UK Medical Research Council (MRC) trials (Leach et al. 2005). This enabled demand-related and interactional factors to be explored.

Ethnography was conducted in two local communities chosen to reflect changing conditions in The Gambia: its rural areas (a village in Upper River Division, URD) and its rapidly expanding urban coastal belt (a site in Western Division, WD). The survey reflected these distinctions. We drew half of the respondents from three rural districts of URD that had received MRC-related support to immunization infrastructure and half from two more urbanized districts of WD (Kombo St Mary and Kombo North).

These two research settings were contextually very different. In rural URD, in the extreme east of the country, villages with their closely clustered, fenced compounds lie in an expanse of savanna, connected by dirt roads which eventually link to the Divisional headquarters, the bustling market town of Basse. Livelihoods are based principally around agriculture, trade and remittances from the many relatives who have migrated out to Europe, other parts of Africa or urban Gambia. Elders nurture 'traditions' (especially celebrations around marriage) as all the more important to attract, and to stem the outflow of, the village's youth lifeblood, while men's and women's groupings – for labour, savings, political, community and health-related activity, often with musical orchestration – are important features of village life. The area is dominated by Mandinka, Fula and Serrehuli speakers who generally occupy separate villages or village quarters, yet with intermarriage very common. A few, larger villages have permanent health centres which generally operate a weekly IWC that administers immunizations. Others depend on the visits of monthly trekking teams.

In contrast, the Kombos in WD have been the foci of rapid immigration both from up-country Gambia and neighbouring countries. Settlements that were Mandinka and Wolof villages in the 1960s have now been engulfed by peri-urban expansion so that populations now comprise both long-term residents, including descendants of old village-founders, and immigrants who have either purchased land, and built high walled compounds, or rent accommodation. Land is now scarce and prices high. People from diverse ethnic groups now live side-by-side; community events persist, but not all participate in them. Livelihoods have shifted from their once-agricultural focus to a diverse mixture of urban gardening, trade, service occupations, professions and short-term jobs, including in the coast's tourist hotels. The dense network of health centres and trekking posts, combined with peri-urban road infrastructure and public transport, means that people can get to IWCs relatively easily but that these are often extremely crowded.

All children aged 12–24 months resident in these Divisions at the time of survey (October–December 2003 for WD, January–March 2004 for URD) were eligible for the survey. The survey focused on immunization throughout the first 12 months of life, minimizing any seasonal bias in the responses. The high response rate in both settings (see Results) suggested limited seasonal bias due to mothers' availability. The survey in the dry season in URD coincided with a period of increased travel both into and out of village communities. We used a two-stage stratified sampling process to select 800 respondents in URD and 800 in WD. Enumeration areas used for the 1993 Census were identified and 35 in each Division randomly selected. Within each enumeration area, sampling followed a random walk method well established in immunization coverage surveys (Milligan et al. 2004). A team of five fieldworkers identified the mothers of a target number of children by random walk and individually approached them in their compound, arranging to return later if an identified mother was out or too busy. Interviews were conducted in the mother's home setting in an informal atmosphere, often while she nursed her baby or tended to minor household chores.

The study was approved by the joint Gambian Government and MRC Research Ethics Committee, and followed its recommended informed consent procedures for a study of this kind. Oral research permissions were solicited and given by the appropriate district authorities

and settlement leaders. The study was explained verbally to each interviewee in an agreed form, and verbal consent to proceed solicited and signed by the fieldworker before continuing with the interview – an appropriate procedure in the Gambian context where interviewee signatures are socially sensitive and tend to be associated by participants with legal matters or the taking of clinical samples.

Questionnaire design

The questionnaire was developed following 8 months of ethnographic study (2 months each by Leach and Fairhead of interviewing and participant observation; 8 months of narrative interviews by Small, split equally between the two sites). It was designed to explore hypotheses about mothers' immunization understandings and practices as part of broader notions of protecting child health, and about the process and timing of immunization decisions.

The questionnaire covered the following issues: mother's social profile (wealth status linked to compound appearance and landlord/tenant status; stage in reproductive life; ethnicity; marital status; access to mobile phone; western/Koranic education; occupation; husband's occupation); child health biography (conditions since birth); expectations of immunization; immunization biography (practice and experience around each batch of immunizations); experiences, perceptions and practices of different health providers (government IWCs, Islamic practitioners, local herbalists, participation in MRC studies). A number of free text questions were included. Data concerning recorded immunizations and their dates were also copied from the child's health card where available. Survey data have been lodged at the UK Economic and Social Research Council (ESRC) data archive.

Analysis

Quantitative data were stratified into responses from the urban west and the rural east. Descriptive statistics and univariate analyses are reported separately for each geographical setting. Statistical analyses took account of clustering by enumeration area. Quantitative data were analyzed using STATA^{TM} Version 8 software. Free text was coded by Leach and Fairhead where appropriate.

Categories of 'default' were developed, based on local understandings of the vaccination schedule. The ethnography suggested that people differentiate between vaccines according to timing-related groups: those given just after birth; the '3 month injections' (suggesting both three sets of injections given over 3 months and also starting, for many, when the child is about 3 months old), and the '9 month injections'. These local categories correspond to BCG/hepatitis, to diptheria/tetanus/polio triple doses 1, 2 and 3 (DTP1, DTP2 and DTP3), and to measles/yellow fever. Specific default measures were established for BCG (default defined as not having BCG by 6 weeks after birth or not at all by the time of interview); for DTP (default defined by not having received DTP3 by 8 months after birth or not at all by the time of interview), and measles (default defined by not having received measles vaccine by 12 months after birth or not at all by the time of interview). Of these, we used measles (the last in the sequence) as an indicator of 'general default' against which to explore association with a range of social variables.

Results and discussion in relation to ethnography

Of 1603 individuals approached, 1600 agreed to take part, a response rate of 99.8%. Health card data were available for 711 urban and 734 rural respondents for analysis of defaulting.

Social profile

Table 1 describes the social profile of respondents, comparing the urban west and rural east. According to the fieldworkers' perception of the appearance of compounds, the urban west appeared wealthier than the rural east. In the rural east, however, nearly 80% of women reported living in a compound belonging to their husband's family or husband, as expected given traditional patrilineal kinship and residence patterns (only 8% rented). In contrast in the urban west, husband's owner-occupation was the status of only 40% of women, with a further 40% living in a compound rented from a landlord. This pattern is consistent with high levels of immigration into these areas, and with land speculation for renting out by long-term residents. Seventy-four per cent of urban compounds had a phone or mobile phone, compared with 36% of rural ones.

Nearly all women in the rural east farmed or gardened and about a quarter were involved in petty trading. In the urban west, livelihoods were more varied and did not revolve around farming. The large category of 'other' work for men (40%) included service occupations (e.g. in transport and tourism), and selling labour in a variety of short-term jobs. In the rural east, both men and women were more likely to have had no western education, but levels of Koranic education varied less.

Views on immunization

Our ethnographic research suggested that routine vaccinations at government-run IWC have, for many mothers, become an integral part of the broader field of concepts and practices for maintaining infant health. Like other injections, they are interpreted as powerful substances which go directly into the blood, where they play multiple roles. In the survey, mothers were asked an open question: 'what do you think the injections given to children at the IWC are for'? Their narrative responses fell into the categories in Table 2, with some mothers citing more than one role.

Table 1. Social profile of respondents, by district

	District		
	Urban/peri-urban *Denominator = 800*		Rural *Denominator = 800*
	Mean (95% CI)	$P = 0.0063$	Mean (95% CI)
Mean age of child in months	17.6 (17.4–17.9)		17.1 (16.7–17.5)
	Column% (95% CI)		Column% (95% CI)
Appearance of compound		$P = 0.0004$	
Wealthy	15.3% (11.4–20.1%)		8.7% (5.4–13.7%)
Medium	41.7% (37.3–46.2%)		27.6% (21.0–35.4%)
Poor	43.1% (38.4–47.8%)		63.7% (53.8–72.6%)
Total	*100.0%*		*100.0%*
Mother's category of reproductive life		$P = 0.0061$	
Young woman	13.8% (10.8–17.3%)		7.9% (5.4–11.6%)
Newly married with few children	43.7% (38.8–48.7%)		39.9% (34.15–45.9%)
Woman in middle of reproduction	32.7% (28.3–37.4%)		36.4% (31.8–41.3%)
Woman at end of reproduction	9.6% (7.7–12.0%)		15.2% (12.3–18.5%)
Old woman	0.3% (0.1–1.0%)		0.7% (0.3–1.5%)
Total	*100.0%*		*100.0%*
Number of children		$P < 0.0001$	
Mean (95% CI)	3.1 (3.0–3.3)		3.8 (3.6–3.9)
Median (lower and upper quartiles)	1.75 (3, 4)		2 (3, 5)
		$P < 0.0001$	
1	13.8% (10.8–17.3%)		8.4% (5.7–12.2%)
2	25.9% (22.8–29.2%)		19.6% (17.2–22.2%)
3	20.3% (17.4–23.5%)		17.0% (14.6–19.8%)
4	14.2% (12.0–16.7%)		17.0% (13.9–20.7%)
5	10.9% (8.8–13.3%)		13.9% (11.5–16.7%)
6+	15.1% (12.4–18.2%)		24.1% (21.6–26.8%)
Total	*100.0%*		*100.0%*
Ethnic group		$P < 0.0001$	
Mandinka	31.6% (25.8–38.1%)		30.9% (20.5–43.5%)
Fula	20.6% (16.5–25.5%)		38.2% (27.4–50.3%)
Wolof	11.0% (8.4–14.3%)		0.8% (0.2–3.1%)
Serrehuli	3.6% (1.9–6.8%)		27.1% (15.8–42.4%)
Jola	17.5% (13.5–22.4%)		0.4% (0.1–1.2%)
Other	15.6% (10.7–22.4%)		2.7% (1.5–4.8%)
Total	*100.0%*		*100.0%*
Currently married		$P < 0.0001$	
Married 1st husband	78.5% (74.2–82.3%)		84.4% (81.5–87.0%)
Married 2nd+ husband	11.3% (9.4–13.5%)		13.6% (11.2–16.4%)
Separated/divorced	1.8% (1.1–2.8%)		0.1% (0.0–1.0%)
Widowed	1.0% (0.5–1.9%)		0.8% (0.4–1.7%)
Inherited widow	0		0.1% (0.0–1.0%)
Never married	7.5% (5.2–10.8%)		0.9% (0.4–2.5%)
Total	*100.0%*		*100.0%*
Compound belongs to		$P < 0.0001$	
Husband's extended family	25.8% (22.7–29.1%)		46.3% (39.4–53.4%)
Wife's extended family	15.0% (11.9–18.7%)		8.7% (6.3–11.7%)
Husband	13.6% (9.9–18.5%)		35.6% (29.8–41.8%)
Woman	1.0% (0.5–2.2%)		0.1% (0.0–1.0%)
Rented from a landlord	40.0% (34.5–45.8%)		8.5% (3.6–18.7%)
Other	4.6% (2.8–7.5%)		0.8% (0.3–1.9%)
Total	*100.0%*		*100.0%*
(Mobile) phone in compound		$P < 0.0001$	
Yes	73.5% (67.4–78.8%)		35.7% (26.3–46.5%)
No	26.5% (21.2–32.6%)		64.3% (53.5–73.7%)
Total	*100.0%*		*100.0%*
Years of education		$P < 0.0001$	
None	42.2% (37.0–47.6%)		63.8% (55.8–71.2%)
1–5 years	18.3% (15.8–21.1%)		21.3% (16.4–27.2%)
>5 years	36.8% (31.8–42.1%)		12.1% (9.0–16.1%)
Been to school but unspecified no. of years[a]	2.8% (1.8–4.1%)		2.8% (1.6–4.8%)
Total	*100.0%*		*100.0%*
Years of Western/Tubab education		$P < 0.0001$	
None	55.1% (50.3–59.8%)		84.6% (79.5–88.6%)
1–5 years	10.9% (9.0–13.1%)		5.9% (3.6–9.3%)

(Continued)

Table 1. Continued

	District		
	Urban/peri-urban *Denominator = 800*		Rural *Denominator = 800*
>5 years	31.3% (26.5–36.5%)		6.8% (4.5–10.1%)
Been to school but unspecified no. of years of Western/Tubab education[a]	2.8% (1.8–4.1%)		2.8% (1.6–4.9%)
Total	*100.0%*		*100.0%*
Years of Koranic education		$P = 0.3202$	
None	76.4% (72.6–79.8%)		74.2% (65.6–81.2%)
1–5 years	14.5% (12.1–17.3%)		18.2% (12.9–25.2%)
>5 years	6.4% (4.6–8.9%)		4.8% (3.1–7.4%)
Been to school but unspecified no. of years of Koranic education[b]	2.8% (1.8–4.1%)		2.8% (1.6–4.9%)
Total	*100.0%*		*100.0%*
Respondent does activities that earn income in money?[c]			
		$P < 0.0001$	
Farming	1.3% (0.5–3.0%)		76.7% (63.9–86.0%)
		$P = 0.0096$	
Vegetable gardening	6.4% (2.6–14.8%)		20.9% (13.7–30.6%)
		$P = 0.0014$	
Petty trading	40.3% (35.9–44.8%)		23.1% (16.1–32.1%)
		$P = 0.0008$	
Fish processing	2.8% (0.6–11.0%)		0.1% (0.0–1.0%)
		$P = 0.0976$	
Business or long-distance trade	2.0% (1.2–3.3%)		6.6% (0.2–2.4%)
		$P = 0.1316$	
Teacher/professional	1.1% (0.6–2.0%)		0.3% (0.0–1.9%)
		$P < 0.0001$	
Other	51.2% (44.7–57.7%)		24.2% (18.7–30.7%)
Husband's years of education[d,e]		$P = 0.0001$	
None	18.7% (14.3–24.1%)		32.2% (24.5–40.9%)
1–5 years	3.6% (2.6–5.1%)		7.1% (4.7–10.5%)
5+ years	28.2% (24.8–31.8%)		14.9% (11.0–19.9%)
Husband has been to school but unspecified no. of years of education	48.3% (42.3–54.3%)		44.1% (36.5–52.0%)
Don't know if husband has been to school	1.3% (0.6–2.6%)		1.8% (0.9–3.4%)
Total	*100.0%*		*100.0%*
Husband's years of Western/Tubab education[d,e]		$P < 0.0001$	
None	19.0% (14.5–24.5%)		32.2% (24.5–40.9%)
1–5 years	2.8% (1.9–4.1%)		2.9% (1.8–4.6%)
5+ years	24.1% (20.7–28.0%)		4.9% (3.1–7.7%)
Husband has been to school but unspecified no. of years of education	52.9% (46.9–58.8%)		58.2% (49.9–66.1%)
Don't know if husband has been to school	1.3% (0.6–2.6%)		1.9% (1.0–3.5%)
Total	*100.0%*		*100.0%*
Husband's years of Koranic education[d,f]		$P < 0.0001$	
None	19.1% (14.6–24.7%)		32.2% (24.5–41.0%)
1–5 years	3.1% (1.9–4.9%)		5.2% (3.3–8.1%)
5+ years	4.6% (3.0–6.9%)		10.6% (7.6–14.6%)
Husband has been to school but unspecified no. of years of education	72.0% (65.5–77.6%)		50.3% (42.6–58.0%)
Don't know if husband has been to school	1.3% (0.6–2.6%)		1.8% (0.9–3.4%)
Total	*100.0%*		*100.0%*
Husband's usual work[c,d]		$P < 0.0001$	
Farmer	2.4% (1.1–5.0%)		59.0% (48.3–68.9%)
		$P = 0.1214$	
Trader	18.8% (15.5–22.6%)		14.4% (10.8–19.1%)
		$P = 0.0485$	
Fisherman	3.8% (0.8–15.3%)		0.8% (0.4–1.7%)
		$P = 0.3152$	
Settlement head	0.1% (0.0–1.0%)		0
		$P = 0.8063$	
Imam/Marabout	3.1% (1.9–4.9%)		3.4% (1.7–6.8%)
		$P = 0.0071$	

(Continued)

Table 1. Continued

	District		
	Urban/peri-urban *Denominator = 800*		Rural *Denominator = 800*
Teacher/professional	8.4% (6.2–11.3%)	$P = 0.0080$	3.7% (2.2–6.2%)
Trade or craft (e.g. mason)	20.2% (17.8–22.9%)	$P = 0.3013$	12.9% (9.4–17.5%)
Student or apprentice	0.4% (0.1–1.3%)	$P = 0.0070$	0.1% (0.0–1.0%)
Retired	1.5% (0.6–4.0%)	$P = 0.0124$	0.1% (0.0–1.0%)
Other	40.2% (35.6–45.0%)	$P = 0.0013$	29.8% (24.0–36.4%)
Don't know	3.1% (2.0–4.6%)	$P < 0.0001$	0.8% (0.4–1.7%)
Husband travels away to work[d]			
No	96.9% (95.4–98.0%)		99.2% (98.3–99.6%)
Yes	3.1% (2.0–4.6%)		0.8% (0.4–1.7%)
Total	*100.0%*		*100.0%*

[a]There remains a highly statistically significant association between districts by whether or not women who reported going to school but who did not specify the number of years of education they had received, are in/excluded ($P < 0.0001$).
[b]There is no statistically significant association between districts by whether or not women who reported going to school but who did not specify the number of years of education they had received, are in/excluded ($P = 0.4392$ and $P = 0.3324$).
[c]Respondents could reported more than one response so column% do not sum to 100%.
[d]Among women reporting that they were currently married to either their first, second or a later husband.
[e]There remains a highly statistically significant association between districts by whether or not women who reported that their husbands went to school but who did not specify the number of years of education they had received, are in/excluded ($P \leq 0.0001$).
[f]Excluding women who reported that their husbands went to school but who did not specify the number of years of education they had received results in a non-statistically significant association ($P = 0.6017$).

Table 2. Views on the effects of immunization based on coded free text

	Urban/peri-urban (*Denominator = 800*)	Rural (*Denominator = 800*)
Protect from disease	64%	67%
Strengthen/improve health	47%	59%
Cure/expel disease	3%	10%
Promote growth	2%	1%
Don't know	6%	4%

Note: Percentages may add up to over 100% as some mothers reported more than one effect.

Of the two-thirds of mothers who said immunizations protected against disease, a few offered further theorization of how this might work: For instance 'The injection ''medicine'' scatters in the child's body and protects the child from illnesses', or 'It serves as a wall or a mechanism for defence against diseases that might have attacked them'. Some mothers specified the type of disease that immunizations were effective against, either as 'small illnesses' or as 'those transferred from one person to another'. Only a very few mentioned specific diseases, or made statements such as: 'I think every disease has its own injection'. Three per cent of urban and 10% of rural mothers thought immunizations cured illness, although in nearly all cases these mothers mentioned a protective effect as well.

For 47% in the urban west and 59% in the rural east, immunizations were seen to play a more general role in giving a child 'strength' or 'power' to withstand or cope with illness, thus protecting health in a more general sense: for example, 'The injection strengthens the health of the child. It gives the child good body. It also protects her.' The idea of 'good body' here refers to a perceived link between a child's plumpness and their strength. Indeed, a small proportion of mothers (1%) specifically reported that immunizations promote growth: 'They also ''nourish'' the child. I believe the injections have something in them that helps children grow well.'

These responses are consistent with our ethnographic evidence of local perceptions of illness, prevention and treatment. People generally consider that a large variety of illnesses can set back an infant's growth and development. Within a complex set of causal fields, these are variously attributed to physical happenings (e.g. falls, exposure to bad wind or damp, sometimes linked to the entering of a disease seed – *kuran keso* – into the body), to the agency of djinn spirits or 'bad people', to events which disrupt socio-ecological orders (e.g. a frog eating faeces left in a courtyard, or social pollution of breastmilk), or to Allah. The causal fields for different childhood illnesses can interact, while the state of being ill can be both hastened by and further encourage weakness caused by other problems, such as those with feeding. While most mothers in the survey did associate vaccinations with 'protection', ethnographic findings suggest that they do

not distinguish as clearly as health personnel between vaccines for prevention and injections for cure: the same word (*penko* in Mandinka) is used for both, and injections are generally seen to help strengthen the body to cope with or stave off illness.

A further ethnographic finding, supported by the survey's narrative responses, was a prevalent view that an apparently healthy child might have 'hidden sickness' that immunization would expel: for instance, 'I think the children may look healthy whilst they are having problems; that's why injections are given to them, to treat those sicknesses'. Some considered nurses at the clinic to have a special ability to detect such hidden illnesses, and interpreted the weighing of the child, a procedure that always precedes immunization in clinic routines, as a screening procedure to evaluate his or her strength/power, and hence the need for injections that day: for example, 'The child is weighed and the nurses will know if he has power or not. Then he is injected if seen to be weak.' Given this perceived link between weight and power, the weighing scales and the queue to be weighed assume a special importance in mothers' social experiences of the clinic. Weighing is seen as a valuable means of assessing a child's strength, yet weighing in full view of other mothers is also thought to make a child vulnerable as, if others see that power, they may harm the child.

Table 3 reports mothers' expectations of protection by immunization in relation to vaccine preventable disease and other diseases. Twenty-nine per cent of mothers in the urban west, and 48% in the rural east, reported no 'correct' diseases. Many of those reporting 'correct' diseases also mentioned others. Malaria and diarrhoea were the most commonly cited 'incorrect' diseases. A majority of mothers naming three or more 'correct' diseases also mentioned one of these. These proportions would be increased further if 'fever' (named by 19% of all urban mothers and 42% of rural mothers as part of 'other' in Table 3), and 'stomach problems' or 'vomiting' (6% urban, 20% rural) were added. Other diseases named included 'small rashes' or pox (named by 6% of urban mothers and 8% of rural), headache (2% urban, 7% rural), common cold (2% in each setting), HIV/AIDS (2% urban) and eye problems (1% in each setting), as well as diabetes, hypertension, teething problems and 'small illnesses'. Notably, many conditions which mothers believe to be vaccine-preventable are being identified by symptom rather than disease name, and may in fact be a 'correct' symptom of a 'correct' disease. However, the naming of many symptoms also corresponds with mothers' views that vaccination protects generally against illness, including the multiple 'small illnesses' that afflict children.

Table 4 explores these responses in relation to mothers' educational status. A principal finding here is that the more educated mothers named more diseases, regardless of whether they are correct. While the more educated name more of the correct diseases, they also name more of the incorrect ones; a generalization that does not vary between rural and urban settings. These findings could be taken to suggest that mothers have a more generalized, rather than disease-specific, understanding of the value of immunization, and with education, are simply able to name a greater range of common childhood diseases. However, they could also imply a greater tendency towards disease-specific understandings of vaccination with education – regardless of whether this knowledge is correct.

Immunization and other forms of child protection

The ethnography showed that in both rural and urban areas, Gambian mothers seek treatment or protection for their infants from a wide range of providers, including local herbalists, women and men renowned for their knowledge of particular ailments, Islamic marabouts, Village Health Workers, personnel at the IWC and MRC staff. In contrast with prevailing views amongst many Gambian health professionals that as mothers become appreciative of 'modern' biomedical health care provision they shun the more 'traditional' forms, mothers generally regard them as complementary, continuing to use a range of providers according to the nature of the ailment and practical factors.

In particular, for protection, many parents seek out talismen (usually small leather pouches containing Arabic script prepared by marabouts) to tie around their child's waist, neck or wrist. At interview, 57% of children in the urban west and 51% in the rural east were wearing a talisman (Table 5). This did not vary according to education (western or Koranic), although there was an ethnic distinction, with talismen largely absent among the Serehule, linked to their particular perspective on Islam that discourages the use of talismen. (However, as we show in the next section, such differences did not affect immunization status which showed no significant variation according to ethnicity per se). Mothers view talismen as complementing immunization, either directly – 'It is for protection just like the injections given to children at the clinics' or 'The talisman the child has on is meant to protect the child against transmittable diseases like measles and yellow fever' – or by protecting the child against other threats for which western biomedicine is ineffective, such as certain local categories of disease, 'witchcraft' or the harmful 'bad medicine' of others. Of those without talismen, some mothers explained that they simply had not bothered, but others rejected talismen as counter to their religious beliefs or pro-biomedical outlook: for example, 'We do not like talismen; we believe in Allah, and scientific knowledge'.

The ethnography suggested that talismen were particularly appreciated in crowded settings such as clinics (and markets) where the likelihood of a child catching ailments from 'bad people' was enhanced. Only half of the mothers of those children wearing a talisman at interview said they wore it at clinic. However, of all respondents, 53% urban and 47% rural (thus including many not wearing them at interview) said they liked to wear them

Table 3. Expectations of immunization, by district

	District		
	Urban/peri-urban *Denominator = 800* Column % (95% CI)		Rural *Denominator = 800* Column % (95% CI)
Diseases that mother reports immunization can protect against			
		$P = 0.8383$	
Tuberculosis	14.0% (11.2–17.4%)		13.4% (9.5–18.7%)
		$P < 0.0001$	
Polio	48.9% (39.3–48.6%)		22.5% (17.7–28.0%)
		$P = 0.3362$	
Hepatitis	0.1% (0.0–0.9%)		0%
		$P = 0.1441$	
Diphtheria	1.4% (0.7–2.6%)		0.5% (0.2–1.7%)
		$P = 0.0003$	
Whooping cough	22.1% (19.5–25.0%)		10.4% (6.9–15.3%)
		$P = 0.0101$	
Neonatal tetanus	14.1% (11.6–17.1%)		8.6% (6.2–11.9%)
		$P = 0.0014$	
Measles	40.6% (36.0–45.4%)		26.3% (20.3–33.4%)
		$P < 0.0001$	
Yellow fever	15.8% (12.5–19.7%)		4.4% (2.8–6.9%)
		$P = 0.1067$	
Malaria	36.8% (32.2–41.6%)		42.3% (37.5–47.2%)
		$P = 0.4575$	
Meningitis	19.5% (16.6–22.8%)		17.2% (12.5–23.1%)
		$P < 0.0001$	
Diarrhoea	25.0% (22.5–29.8%)		42.4% (37.7–47.3%)
		$P < 0.0001$	
Other	37.5% (33.5–41.7%)		65.6% (60.6–70.2%)
% reporting protection against malaria and/or diarrhoea		$P < 0.0001$	
Of all respondents	48.3% (43.3–53.3%)		69.3% (64.5–73.7%)
		$P = 0.0066$	
Of respondents reporting protection against 3+ correct diseases	34.9% (26.8–43.8%)		58.1% (43.9–71.0%)
% of women who only reported protection against correct diseases[a]		$P < 0.0001$	
	33.0% (28.6–37.7%)		13.7% (10.2–18.2%)
Number of 'correct diseases' reported[a]		$P < 0.0001$	
0	28.6% (24.6–33.0%)		47.9% (41.3–54.6%)
1	24.6% (21.8–27.7%)		28.7% (24.4–33.5%)
2	24.9% (21.8–28.2%)		15.2% (11.7–19.4%)
3	13.6% (11.3–16.3%)		6.5% (4.5–9.3%)
4+	8.3% (6.3–10.8%)		1.7% (0.9–3.2%)
Total	100%		100%

[a]'Correct diseases' include: tuberculosis, polio, hepatitis, diphtheria, whooping cough, neonatal tetanus, measles and yellow fever.

at clinic, suggesting the possibility that some put them on especially for clinic.

In the urban west, many mothers' statements emphasized their value while at the clinic itself: for example,

> 'Because a lot of people meet there so you cannot tell who is who, and who might be a witch';
>
> 'At the clinic sometimes there are certain talisman types with other children that can make your child sick when they share the same weighing scale';
>
> 'The talismen are to protect the child from evils, because he seems to be loved by everyone, anytime he is taken out and people do talk a lot about him, saying Oh! He is handsome. He has a good weight, and so on.'

Such responses suggest mothers' anxieties about social vulnerability at the clinic in the urban setting.

In the rural east, by contrast, mothers' narratives did not express worries about the clinic itself but about the journey there, describing how they put on talismen because the route, along isolated bush paths where there might be djinn spirits, was dangerous.

Vaccination uptake and default

The questionnaire explored decisions, practices and influential factors around each of the immunization groups described above, and linked them to health card data in order to explore their relation with the various categories of default described above.

Since analyses showed no significant difference in defaulting rates between female and male children in the urban and rural settings, at the BCG, DTP or

Table 4. Expectations of immunization, by level of education and district

	Urban/peri-urban district Years of western/Tubab/Koranic education			Rural district Years of western/Tubab/Koranic education		
	None *Denominator = 337* Column % (95% CI)	1–4 years *Denominator = 166* Column % (95% CI)	5+ years *Denominator = 296* Column % (95% CI)	None *Denominator = 504* Column % (95% CI)	1–4 years *Denominator = 199* Column % (95% CI)	5+ years *Denominator = 97* Column % (95% CI)
Diseases that mother reports immunization can protect against						
		$P = 0.0046$			$P = 0.8665$	
Tuberculosis	8.3% (5.4–12.5%)	18.1% (11.5–27.2%)	18.2% (13.8–23.8%)	12.9% (8.3–19.5%)	14.4% (9.0–22.1%)	14.3% (8.3–23.4%)
		$P < 0.0001$			$P = 0.0128$	
Polio	33.2% (27.9–39.0%)	45.2% (36.4–54.3%)	55.4% (49.6–61.1%)	18.8% (13.4–25.6%)	25.4% (16.8–36.5%)	36.3% (28.6–44.7%)
		$P = 0.4764$			P n.a.	
Hepatitis	0%	0%	0.3% (0.0–2.5%)	0%	0%	0%
		$P = 0.1321$			$P = 0.0723$	
Diphtheria	0.6% (0.1–2.5%)	1.2% (0.3–4.8%)	2.4% (1.2–4.6%)	0.4% (0.0–1.7%)	0%	2.2% (0.5–9.1%)
		$P = 0.0570$			$P = 0.8091$	
Whooping cough	18.7% (14.4–24.0%)	28.9% (22.3–36.6%)	22.3% (18.1–27.1%)	9.8% (6.1–15.4%)	11.1% (6.3–18.6%)	12.1% (5.0–26.4%)
		$P = 0.1203$			$P = 0.6073$	
Neonatal tetanus	11.3% (7.9–15.8%)	15.1% (10.6–20.9%)	16.9% (12.7–22.2%)	8.8% (5.7–13.2%)	7.2% (4.0–12.7%)	11.0% (5.9–19.5%)
		$P = 0.0005$			$P = 0.0012$	
Measles	34.4% (28.5–40.9%)	36.8% (29.7–44.5%)	50.0% (43.2–56.9%)	21.7% (14.9–30.3%)	29.3% (21.6–38.3%)	45.1% (21.6–38.3%)
		$P < 0.0001$			$P = 0.0175$	
Meningitis	13.4% (10.6–16.8%)	15.1% (10.4–21.4%)	29.1% (24.7–33.8%)	14.8% (10.2–20.9%)	18.2% (11.8–27.1%)	27.5% (18.1–39.4%)
		$P < 0.0001$			$P = 0.0029$	
Yellow fever	8.9% (6.3–12.5%)	12.7% (8.1–19.1%)	25.3% (19.3–32.6%)	2.5% (1.2–5.2%)	5.5% (2.3–12.6%)	12.1% (7.1–19.9%)
		$P = 0.4074$			$P = 0.7238$	
Malaria	34.1% (27.5–41.4%)	38.0% (31.0–45.4%)	39.2% (32.8–46.0%)	42.3% (36.4–48.5%)	40.3% (31.0–50.4%)	46.2% (35.8–56.9%)
		$P = 0.0692$			$P = 0.3277$	
Diarrhoea	21.7% (17.1–27.0%)	27.7% (21.2–35.4%)	30.1% (24.2–36.7%)	42.1% (36.1–48.3%)	39.8% (31.3–48.9%)	49.5% (40.2–58.8%)
		$P = 0.0173$			$P = 0.0775$	
Other	31.2% (26.4–36.4%)	41.0% (33.2–49.3%)	42.9% (35.7–50.5%)	68.3% (63.1–73.2%)	59.1% (50.0–67.6%)	63.7% (52.9–73.3%)
% reporting protection against malaria and/or diarrhoea		$P = 0.1764$			$P = 0.7579$	
Of all respondents	44.2% (36.9–51.8%)	50.6% (43.8–57.4%)	51.7% (44.3–59.0%)	69.4% (64.2–74.1%)	68.0% (58.8–76.0%)	71.4% (63.8–78.0%)
		$P = 0.5020$			$P = 0.2919$	
Of respondents reporting 3+ correct diseases	38.5% (25.8–53.0%)	40.0% (22.1–61.0%)	30.7% (21.9–41.1%)	48.0% (29.4–67.2%)	70.0% (42.8–87.9%)	58.8% (35.9–78.5%)
		$P = 0.0052$			$P = 0.2919$	
% of women who only reported protection against correct diseases[a]	27.0% (21.9–32.8%)	33.1% (26.8–40.2%)	39.9% (32.7–47.5%)	52.0% (32.8–70.6%)	30.0% (12.1–57.3%)	41.2% (21.6–64.1%)
		$P < 0.0001$			$P = 0.0025$	
Number of 'correct diseases' reported[a]						
0	40.4% (34.7–46.3%)	24.7% (18.2–32.6%)	17.2% (12.7–22.9%)	50.8% (42.9–58.8%)	47.5% (38.5–56.7%)	33.0% (22.5–45.4%)
1	23.2% (19.6–27.2%)	23.5% (17.3–31.1%)	27.0% (22.0–32.8%)	30.0% (24.8–35.8%)	26.5% (19.9–34.4%)	26.4% (16.5–39.4%)
2	21.1% (16.9–26.0%)	30.7% (24.4–37.9%)	26.0% (21.7–30.9%)	14.0% (10.1–19.1%)	14.9% (10.1–21.4%)	22.0% (13.9–33.0%)
3	11.9% (9.4–14.9%)	15.1% (9.7–22.6%)	14.9% (10.7–20.3%)	4.4% (2.5–7.6%)	8.3% (4.9–13.6%)	14.3% (8.5–23.1%)
4+	3.6% (1.9–6.7%)	6.0% (3.2–11.0%)	14.9% (10.5–20.7%)	0.8% (0.3–2.2%)	2.8% (1.0–7.2%)	4.4% (1.7–10.9%)
Total	100%	100%	100%	100%	100.0%	100.0%

[a]'Correct diseases' include: tuberculosis, polio, hepatitis, diphtheria, whooping cough, neonatal tetanus, measles and yellow fever.

Table 5. Factors associated with the child wearing a talisman/juju at interview, by district

	Urban/peri-urban district			Rural district		
	Row % (95% CI)	OR (95% CI)	*Denominator*	Row % (95% CI)	OR (95% CI)	*Denominator*
All	57.5% (52.0–62.7%)	–	*799*	51.1% (42.1–60.0%)	–	*800*
Ethnic group		$P=0.0009$			$P=0.0001$	
Mondinka	67.5% (61.8–72.7%)	1.00	*252*	66.0% (58.8–72.5%)	1.00	*258*
Fula	52.7% (44.7–60.6%)	0.54 (0.33–0.87)	*165*	64.5% (55.3–72.6%)	0.94 (0.58–1.50)	*289*
Wolof	59.1% (47.8–69.5%)	0.70 (0.42–1.15)	*87*	[50.0% (27.4–72.6%)]	[0.52 (0.18–1.50)]	*[6]*
Serrehuli	13.8% (6.1–28.3%)	0.08 (0.03–0.20)	*29*	14.7% (8.3–24.8%)	0.09 (0.04–0.19)	*223*
Jola	61.4% (53.5–68.8%)	0.77 (0.50–1.18)	*140*	[33.3% (3.8–86.3%)]	[0.26 (0.02–3.55)]	*[3]*
Other	48.0% (28.4–68.2%)	0.45 (0.19–1.06)	*123*	60.0% (39.4–77.6%)	0.77 (0.33–1.83)	*21*
Years of (any) education		$P=0.7520$			$P=0.2929$	
None	57.6% (48.4–66.2%)	1.00	*337*	49.2% (38.6–59.8%)	1.00	*504*
1–5	54.5% (46.5–62.3%)	0.88 (0.59–1.32)	*145*	53.8% (45.0–62.3%)	1.20 (0.79–1.83)	*174*
>5	58.8% (53.7–63.8%)	1.05 (0.70–1.58)	*294*	59.3% (44.8–72.4%)	1.51 (0.87–2.62)	*97*
Been to school but unspecified no. of years	54.6% (33.0–74.6%)	0.88 (0.37–2.13)	*22*	38.1% (17.9–63.45)	0.64 (0.23–1.75)	*25*
Years of western/Tubab education		$P=0.4961$			$P=0.2438$	
None	56.2% (48.8–63.2%)	1.00	*440*	50.1% (40.3–59.9%)	1.00	*678*
1–5	53.5% (42.0–64.6%)	0.90 (0.55–1.46)	*86*	56.8% (43.1–69.6%)	1.31 (0.68–2.54)	*44*
>5	61.2% (55.8–66.4%)	1.23 (0.88–1.72)	*250*	64.7% (48.2–78.3%)	1.83 (0.90–3.72)	*52*
Been to school but unspecified no. of years of western/Tubab education	54.6% (33.0–74.6%)	0.94 (0.39–2.23)	*22*	38.1% (17.9–63.4%)	0.61 (0.23–1.65)	*25*
All	57.5% (52.0–62.7%)	–	*799*	51.1% (42.1–60.0%)	–	*800*
Years of Koranic education		$P=0.7635$			$P=0.6801$	
None	56.8% (50.4–63.0%)	1.00	*609*	51.0% (41.2–60.7%)	1.00	*582*
1–5	62.1% (52.8–70.5%)	1.24 (0.79–1.97)	*116*	53.3% (43.0–63.4%)	1.10 (0.69–1.75)	*151*
>5	54.9% (40.5–68.5%)	0.93 (0.49–1.76)	*51*	52.8% (29.5–74.9%)	1.07 (0.44–2.62)	*41*
Been to school but unspecified no. of years of Koranic education	54.6% (33.0–74.6%)	0.91 (0.39–2.15)	*22*	38.1% (17.9–63.4%)	0.59 (0.21–1.63)	*25*
Husband's years of (any) education[a]		$P=0.2845$			$P=0.4514$	
None	53.7% (41.3–65.8%)	1.00	*134*	51.1% (38.0–64.0%)	1.00	*245*
1–5	73.1% (52.6–86.9%)	2.34 (0.94–5.84)	*26*	61.5% (47.4–74.0%)	1.53 (0.83–2.84)	*55*
>5	60.2% (52.4–67.5%)	1.30 (0.82–2.07)	*201*	55.5% (40.2–69.8%)	1.19 (0.57–2.49)	*121*
Husband has been to school but unspecified no. of years of education	55.2% (49.9–60.4%)	1.06 (0.66–1.71)	*346*	49.5% (40.2–58.9%)	0.94 (0.57–1.56)	*346*
Don't know if husband has been to school	66.7% (33.6–88.8%)	1.72 (0.38–7.78)	*9*	38.5% (16.3–66.8%)	0.60 (0.20–1.84)	*15*
Husband's years of Western/Tubab education[a]		$P=0.1960$			$P=0.6873$	
None	53.7% (41.5–65.5%)	1.00	*136*	51.1% (38.0–64.0%)	1.00	*246*
1–5	75.0% (53.2–88.8%)	2.59 (1.04–6.44)	*20*	66.7% (41.8–84.8%)	1.92 (0.70–5.18)	*21*
>5	61.1% (52.8–68.7%)	1.35 (0.88–2.09)	*172*	55.6% (37.1–72.6%)	1.20 (0.49–2.94)	*39*
Husband has been to school but unspecified no. of years of education	55.4% (50.1–60.6%)	1.07 (0.67–1.72)	*379*	51.1% (41.3–60.8%)	1.00 (0.60–1.68)	*461*
Don't know if husband has been to school	66.7% (33.6–88.8%)	1.73 (0.38–7.76)	*9*	42.9% (19.4–70.0%)	0.72 (0.25–2.09)	*16*
All	57.5% (52.0–62.7%)	–	*799*	51.1% (42.1–60.0%)	–	*800*
Husband's years of Koranic education[a]		$P=0.7652$			$P=0.7677$	
None	53.3% (41.2–65.0%)	1.00	*137*	51.1% (38.0–64.0%)	1.00	*245*
1–5	72.7% (43.8–90.1%)	2.38 (0.60–9.17)	*22*	60.5% (44.4–74.7%)	1.47 (0.71–3.06)	*41*
>5	57.6% (34.5–77.8%)	1.19 (0.41–3.42)	*33*	52.6% (32.4–71.9%)	1.06 (0.43–2.64)	*88*
Husband has been to school but unspecified no. of years of education	57.3% (52.2–62.2%)	1.18 (0.78–1.78)	*515*	51.1% (42.2–59.9%)	1.00 (0.61–1.63)	*392*
Don't know if husband has been to school	66.75 (33.6–88.8%)	1.75 (0.39–7.87)	*9*	42.9% (19.4–70.0%)	0.72 (0.25–2.09)	*16*
Like child to wear talisman/juju to IWC						
Of all respondents[b]	53.3% (40.2–66.0%)	–	*796*	46.7% (34.0–59.8%)	–	*796*
Of respondents wearing talisman/juju at interview[c]	53.7% (40.5–66.4%)	–	*457*	46.3% (33.7–59.5%)	–	*403*

[a]Among respondents who reported that they were currently married.
[b]No significant difference exists between urban/peri-urban and 'upcountry' districts in terms of the proportion of respondents who reported that they like their child to wear talisman/juju to the IWC ($P=0.4795$).
[c]No significant difference exists between urban/peri-urban and 'upcountry' districts in terms of the proportion of respondents whose child was wearing talisman/juju at interview, who reported that they like their child to wear talisman/juju to the IWC ($P=0.0612$).

measles vaccination stages, all tables present combined data on both sexes.

Table 6 summarizes the association between 'general defaulting' (defined around measles) and a range of social factors. Very few social factors were found to be associated with default in the rural east (not ethnicity, nor number of children, nor age, nor wealth, nor occupation). In contrast, a cluster of factors which can be taken as proxies for poverty emerged as significantly associated with general defaulting in the urban west (poor compound, rented compound, no mobile phone, non-Mandinka – the latter indicating higher likelihood of being a recent immigrant, rather than any particular ethno-cultural disposition).

In neither setting was the use of non-biomedical health providers (herbalists, Islamic practitioners and so on) for treatment or protection associated with default, reinforcing the ethnographic finding, discussed earlier, that vaccination is part of a pluralistic field of health-seeking practice. Mother's education appeared to be of some importance in the urban west, where a mother who had more than 5 years of education was less likely to default (and Father's education had similar associations). In the rural east, there was no difference. This effect of education in the urban west could be related to knowledge of biomedicine and immunization, but its relevance could be more economic. In the urban west, only 20% of those naming three or more 'correct' diseases defaulted, by comparison with 29.9% of others ($P = 0.0174$). By contrast, there was no association with the number of 'correct' diseases named in the rural east.

In both rural and urban settings, women with more children more commonly defaulted. This reaches statistical significance in the urban west, where measles default for the fifth child is 34.8%, but for the first child only 16.7%; a difference that ethnographic findings suggest relates an accumulation of workload and childcare difficulties by mothers pursuing diversified livelihoods in socially fragmented urban settings.

Table 7 summarizes the associations between default on each of the three groups of immunizations. More urban mothers than rural mothers did not have, or were late with, a vaccination at least once.

Those who defaulted once in the urban west tended to default on the DTP, whereas in the rural east, defaulting once was more likely to be for BCG (44% on BCG, with only 35% on DTP). This difference may reflect both the greater proportion of urban women giving birth at clinics where BCG is given before they leave, and the greater difficulty for rural women of attending clinics in the early weeks after childbirth. However, while 20% in the rural east did not have BCG before 6 weeks, only 2% did not have it at all. In the urban west, fewer respondents were late (11%), but more of these never had it at all (9% in total). Thus, whereas a late BCG appears relatively easily 'picked up' in the rural setting, in urban areas it is associated with missing BCG entirely.

On DTP, 50.2% of women from the urban west defaulted according to our definition (not completed DTP3 by 8 months), contrasting with only 21.7% of women from the rural east. Non-completion of the DTP schedule was strikingly common in the urban setting, where 57% of women who missed a clinic session – usually due to day-to-day problems – went on to default. In contrast, it appears to be easier to pick up a missed session in the rural areas, which ethnography would suggest is related to the socially organized nature of attendance there, as discussed further below. Fifty-one per cent of urban women also said it was difficult to get to the clinic around the time that these so-called '3 month injections' were due, compared with only 21% of rural mothers. These difficulties relate more to socio-economic issues (workload, travel for diversified livelihoods and distant family events) than to geographical ones, given that distances to clinic are greater in most rural areas.

In relation to measles, it is notable that 25.2% of urban and 17.1% of rural mothers reporting at interview that their child had had the 9 month injections had not had measles vaccination according to their health card. This suggests that within prevailing frameworks of understanding based on timing-related groups of vaccinations, confusion over what injections are due when is relatively common, and that a significant proportion of mothers believe their children fully vaccinated when they are not.

Overall, in the urban setting, default on one immunization appears to signal a pattern of later default to a significantly greater extent than in the rural setting. Thus in the urban west, of those who defaulted on BCG, only 24% would complete the rest of the schedule on time (and of those who defaulted on DTP, 43% went on to default on measles). In the rural east, however, of those who defaulted on BCG, 57% went on to complete the other vaccinations on time. Of those who defaulted on DTP, 38% went on to default on measles.

These differential patterns of schedule completion relate, in turn, to mothers' differentiated social experiences of IWCs in urban and rural areas.

Experiences of and interactions with the clinic

The ethnography suggested that in both settings, attending the IWC was a social event, in which mothers expected to dress themselves and their babies in their best clothes and to interact with others while waiting in the queues for weighing and immunization. Mothers in rural areas were socially organized into attending clinics, by peer group networks and in some cases village music groups that rallied women to attend on clinic days, building on traditions of community group activity. In the more mixed, diversified urban context, however, this social orchestration appeared less frequent, and less inclusive. Some mothers would arrange to attend in groups from

Table 6. Social factors associated with general defaulting[a]

	Urban/peri-urban district			Rural district		
	Mean (95% CI)	–	*Denominator*	Mean (95% CI)	–	*Denominator*
Age of child in months	$P = 0.0131$			$P = 0.5059$		
Non–defaulter	17.4 (17.1–17.7)		*514*	17.2 (16.8–17.6)		*618*
Defaulter	18.1 (17.5–18.7)		*197*	17.0 (16.5–17.6)		*126*
	Row % (95% CI)	OR (95% CI)	*Base*	Row % (95% CI)	OR (95% CI)	*Base*
All	28.1% (23.6–33.0%)	–	*751*	17.9% (14.6–21.6%)	–	*754*
Appearance of compound		$P = 0.0153$			$P = 0.1484$	
Wealthy	27.4% (17.8–39.7%)	1.00	*113*	26.7% (17.7–38.1%)	1.00	*63*
Medium	21.3% (15.6–28.4%)	0.72 (0.38–1.36)	*305*	15.7% (11.3–21.4)	0.51 (0.25–1.03)	*212*
Poor	34.3% (27.5–41.8%)	1.38 (0.72–2.63)	*321*	17.3% (14.4–21.6%)	0.58 (0.33–1.02)	*468*
Mother's category of reproductive life		$P = 0.0184$			$P = 0.0444$	
Young woman	18.0% (11.5–27.1%)	1.00	*100*	11.5% (6.1–20.9%)	1.00	*65*
Newly married with few children	26.8% (21.2–33.3%)	1.67 (0.86–3.21)	*325*	15.0% (11.3–19.7%)	1.35 (0.69–2.67)	*290*
Woman in middle of reproduction	30.8% (24.3–38.2%)	2.02 (1.11–3.69)	*234*	23.4% (18.5–29.2%)	2.35 (1.15–4.79)	*268*
Woman at end of reproduction/old woman	36.6% (25.0–50.1%)	2.63 (1.38–5.01)	*71*	16.2% (9.6–26.0%)	1.48 (0.60–3.67)	*124*
Number of children		$P = 0.0138$			$P = 0.1818$	
1	16.7% (10.1–26.3%)	1.00	*90*	12.2% (6.5–21.9%)	1.00	*57*
2	25.3% (18.8–33.1%)	1.69 (0.82–3.49)	*166*	9.9% (5.6–17.1%)	0.79 (0.39–1.61)	*135*
3	35.65 (26.6–45.8%)	2.76 (1.25–6.13)	*132*	17.6% (11.3–26.3%)	1.53 (0.63–3.72)	*109*
4	25.8% (17.4–36.5%)	1.74 (0.77–3.92)	*93*	21.9% (14.8–31.2%)	2.01 (0.86–4.71)	*109*
5	34.8% (25.9–44.9%)	2.67 (1.39–5.13)	*69*	25.3% (16.3–37.0%)	2.42 (1.09–5.41)	*97*
6+	34.0% (24.3–45.4%)	2.58 (1.38–4.83)	*97*	17.8% (11.9–25.6%)	1.55 (0.69–3.45)	*166*
Ethnic group		$P = 0.0505$			$P = 0.8876$	
Mandinka	22.0% (16.7–28.4%)	1.00	*241*	18.6% (13.6–24.8%)	0.88 (0.50–1.55)	*247*
Fula	38.7% (29.7–48.6%)	2.24 (1.33–3.77)	*155*	16.7% (11.4–24.0%)	0.88 (0.06–13.5)	*265*
Wolof	32.9% (23.4–44.1%)	1.74 (0.99–3.05)	*82*	[16.7% (1.4–74.5%)]	[n.a.]	*[6]*
Serrehuli	28.6% (13.7–50.2%)	1.42 (0.53–3.79)	*28*	17.9% (12.9–24.2%)	0.95 (0.57–1.60)	*215*
Jola	25.8% (17.4–36.5%)	1.23 (0.66–2.29)	*128*	[0%]	[n.a.]	*2*
Other	28.1% (23.5–33.2%)	1.22 (0.70–2.15)	*117*	[27.8% (10.2–56.6%)]	[1.69 (0.50–5.70)]	*19*
Currently married		$P = 0.7867$			$P = 0.0172$	
Married 1st husband	29.1% (24.3–34.5%)	1.00	*587*	16.3% (13.1–20.0%)	1.00	*642*
Married 2nd+ husband	24.4% (15.8–35.7%)	0.79 (0.46–1.35)	*86*	29.4% (20.4–40.3%)	2.14 (1.29–3.53)	*97*
Previously married	23.8% (9.2–49.2%)	0.76 (0.26–2.23)	*21*	[12.5% (1.5–57.6%)]	[0.73 (0.08–7.15)]	*[10]*
Never married	25.0% (13.6–41.5%)	0.81 (0.37–1.77)	*56*	[0%]	[n.a.]	*[5]*
Compound belongs to		$P = 0.0355$			$P = 0.9686$	
Husband's extended family	24.1% (18.6–30.6%)	1.00	*191*	17.3% (12.9–22.9%)	1.00	*368*
Wife's extended family	25.4% (17.7–35.1%)	1.08 (0.68–1.69)	*114*	17.7% (10.1–29.3%)	1.03 (0.50–2.12)	*71*
Husband	23.1% (15.2–33.5%)	0.95 (0.57–1.58)	*104*	18.4% (13.3–25.0%)	1.08 (0.66–1.76)	*249*
Woman	[12.5% (2.0–50.2%)]	[0.45 (0.06–3.35)]	*[8]*	[0]	[n.a.]	*[1]*
Rented from a landlord	34.3% (28.9–40.2%)	1.65 (1.21–2.24)	*300*	19.3% (14.0–26.0%)	1.14 (0.67–1.94)	*57*
Other	23.5% (12.0–41.0%)	0.97 (0.40–2.34)	*34*	[0]	[n.a.]	*[7]*
(Mobile) phone in compound		$P = 0.007$			$P = 0.778$	
Yes	24.6% (19.8–30.0%)	1.00	*550*	17.3% (12.4–23.5%)	1.00	*269*
No	37.8% (29.5–46.9%)	1.87 (1.21–2.90)	*201*	18.3% (14.1–23.3%)	1.07 (0.65–1.76)	*483*
Years of (any) education		$P = 0.0002$			$P = 0.5339$	
None	31.7% (26.7–37.3%)	1.00	*312*	19.2% (15.4–23.7%)	1.00	*471*
1–5	32.6% (24.6–41.9%)	1.04 (0.76–1.43)	*141*	14.1% (8.7–22.1%)	0.69 (0.38–1.25)	*170*
>5	21.5% (16.9–26.8%)	0.59 (0.46–0.75)	*275*	15.9% (10.8–22.6%)	0.79 (0.50–1.24)	*88*
Been to school but unspecified no. of years	31.8% (16.3–52.8%)	1.00 (0.41–2.47)	*22*	23.8% (7.3–55.3%)	1.31 (0.33–5.20)	*25*

Years of western/Tubab education		$P=0.0001$			$P=0.5851$	
None	32.4% (27.1–38.3%)	1.00	*410*	17.6% (14.3–21.5%)	1.00	*639*
1–5	32.6% (23.5–43.2%)	1.01 (0.66–1.52)	*86*	13.6% (5.9–28.3%)	0.74 (0.29–1.85)	*44*
>5	18.5% (14.3–23.7%)	0.47 (0.36–0.63)	*232*	20.5% (13.6–29.5%)	1.20 (0.74–1.93)	*45*
Been to school but unspecified no. of years of western/Tubab education	31.8% (16.3–52.8%)	0.97 (0.38–2.45)	*22*	23.8% (14.5–21.6%)	1.46 (0.36–5.92)	*25*
Years of Koranic education		$P=0.8732$			$P=0.3334$	
None	27.7% (23.1–32.9%)	1.00	*570*	19.3% (15.7–23.6%)	1.00	*542*
1–5	28.4% (19.5–39.4%)	1.04 (0.66–1.64)	*109*	12.0% (6.5–21.3%)	0.57 (0.28–1.18)	*147*
>5	30.6% (17.7–47.5%)	1.15 (0.58–2.28)	*49*	11.8% (5.2–24.5%)	0.56 (0.22–1.39)	*39*
Been to school but unspecified no. of years of Koranic education	31.8% (16.3–52.8%)	1.22 (0.50–2.96)	*22*	23.8% (7.3–55.3%)	1.30 (0.33–5.12)	*25*
Respondent does any activities that earn income in money?[b]						
		[$P=0.665$]			$P=0.053$	
Farming	[33.3% (13.2–62.2%)]	[1.29 (0.40–4.21)]	*[9]*	16.4% (13.1–20.5%)	0.67 (0.44–1.01)	*592*
		$P=0.665$			$P=0.654$	
Vegetable gardening	12.5% (4.3–31.3%)	0.35 (0.11–1.14)	*48*	16.7% (11.0–24.4%)	0.90 (0.57–1.43)	*166*
		$P=0.665$			$P=0.538$	
Petty trading	28.8% (22.7–35.9%)	1.07 (0.76–1.50)	*302*	15.9% (10.1–24.2%)	0.84 (0.47–1.49)	*166*
		[$P=0.585$]			[n.a.]	
Fish processing	[31.8% (18.3–49.3%)]	[1.21 (0.60–2.41)]	*[22]*	[0%]	[n.a.]	*[1]*
		[$P=0.134$]			[$P=0.830$]	
Business or long-distance trade	[7.1% (0.9–40.6%)]	[0.19 (0.02–1.70)]	*[14]*	[20.0% (6.6–47.0%)]	[1.15 (0.30–4.37)]	*[5]*
		[$P=0.665$]			[n.a.]	
Teacher/professional	[22.2% (5.2–59.9%)]	[0.73 (0.14–3.82)]	*[9]*	[0%]	[n.a.]	*[2]*
		$P=0.537$			$P=0.024$	
Other	29.2% (23.7–35.5%)	1.13 (0.75–1.71)	*383*	23.7% (18.2–30.3%)	1.64 (1.07–2.50)	*182*
Husband's years of (any) education[c]		$P=0.0282$			$P=0.3752$	
None	33.3% (25.8–41.9%)	1.00	*123*	17.6% (12.5–24.1%)	1.00	*230*
1–5	38.5% (22.0–58.0%)	1.25 (0.55–2.86)	*26*	18.0% (9.2–32.2%)	1.03 (0.43–2.49)	*53*
>5	19.8% (12.9–29.1%)	0.49 (0.30–0.80)	*187*	11.8% (6.5–20.3%)	0.63 (0.30–1.29)	*113*
Been to school but unspecified no. of years	30.5% (25.7–35.7%)	0.88 (0.58–1.32)	*328*	20.1% (15.7–25.5)	1.18 (0.71–1.96)	*329*
Don't know whether/not husband went to school	44.4% (23.9–33.6%)	1.6 (0.53–4.79)	*9*	25.0% (9.0–52.9%)	1.56 (0.43–5.66)	*14*
Husband's years of western/Tubab education[c]		$P=0.0137$			$P=0.3122$	
None	33.9% (26.0–42.8%)	1.00	*124*	17.6% (12.5–24.1%)	1.00	*230*
1–5	35.0% (18.1–56.8%)	1.05 (0.40–2.78)	*20*	20.0% (5.5–51.9%)	1.17 (0.27–5.01)	*20*
>5	16.2% (10.1–24.8%)	0.38 (0.22–0.65)	*161*	9.4% (2.9–26.3%)	0.49 (0.14–1.71)	*35*
Been to school but unspecified no. of years of western/Tubab education	31.5% (26.7–36.7%)	0.90 (0.60–1.33)	*359*	18.7% (14.6–23.5%)	1.08 (0.66–1.77)	*439*
Don't know whether/not husband went to school	44.4% (22.2–69.2%)	1.56 (0.52–4.69)	*9*	23.1% (8.2–50.1%)	1.41 (0.39–5.04)	*15*
Husband's years of Koranic education[c]		$P=0.2769$			$P=0.8241$	
None	33.6% (25.8–42.4%)	1.00	*125*	17.6% (12.5–24.1%)	1.00	*230*
1–5	28.6% (12.7–52.3%)	0.79 (0.31–1.99)	*21*	18.9% (8.6–36.7%)	1.09 (0.39–3.09)	*40*
>5	38.7% (21.8–58.8%)	1.25 (0.55–2.81)	*31*	13.9% (7.6–24.0%)	0.76 (0.36–1.60)	*82*
Been to school but unspecified no. of years of Koranic education	26.3% (21.5–31.7%)	0.70 (0.46–1.07)	*487*	18.9% (14.6–24.1%)	1.09 (0.66–1.79)	*372*
Don't know whether/not husband went to school	44.4% (22.2–69.2%)	1.58 (0.53–4.75)	*9*	23.1% (8.2–50.1%)	1.41 (0.39–5.04)	*15*
Husband travels away to work[c]		$P=0.686$			$P=0.043$	
Yes	29.1% (23.4–35.6%)	1.00	*395*	21.2% (16.1–27.4%)	1.00	*265*
No	27.7% (22.2–33.9%)	0.93 (0.65–1.33)	*264*	16.0% (12.7–19.9%)	0.71 (0.51–0.99)	*467*
Husband's usual work[b,c]		$P=0.116$			$P=0.331$	
Farmer	[7.1% (0.9–39.0%)]	[0.19 (0.02–1.54)]	*[14]*	16.9% (13.0–21.7%)	0.84 (0.59–1.20)	*442*
		$P=0.294$			$P=0.209$	
Trader	32.3% (23.9–42.1%)	1.25 (0.82–1.90)	*127*	22.3% (14.8–32.2%)	1.39 (0.83–2.33)	*105*
		$P=0.671$			[n.a.]	
Fisherman	26.9% (23.9–33.6%)	0.92 (0.62–1.37)	*26*	[0%]	[n.a.]	*[8]*
		[n.a.]			[n.a.]	

(Continued)

Table 6. Continued

	Urban/peri-urban district			Rural district		
Alkalo	[0%]	[n.a.]	*[1]*	[n.a.]	[n.a.]	*0*
		$P = 0.752$			$P = 0.008$	
Imam/Marabout	31.8% (14.5–56.3%)	1.18 (0.42–3.30)	*22*	34.8% (21.4–51.2%)	2.54 (1.30–4.94)	*26*
		$P = 0.882$			$P = 0.140$	
Teacher/professional	27.6% (16.2–42.9%)	0.95 (0.47–1.90)	*58*	7.7% (2.1–24.8%)	0.37 (0.10–1.41)	*28*
		$P = 0.535$			$P = 0.960$	
Trade or craft (e.g. mason)	30.8% (23.4–39.4%)	1.15 (0.73–1.80)	*133*	17.8% (11.1–27.3%)	0.99 (0.58–1.68)	*96*
		[n.a.]			[n.a.]	
Student or apprentice	[0%]	[n.a.]	*[3]*	[0%]	[n.a.]	*1*
		[$P = 0.089$]			[n.a.]	
Retired	10.0% (2.5–32.9%)	[0.27 (0.06–1.23)]	*[11]*	[0%]	[n.a.]	*1*
		$P = 0.541$			$P = 0.334$	
Other	27.2% (20.6–34.9%)	0.90 (0.63–1.28)	*272*	16.0% (12.1–20.9%)	0.83 (0.56–1.23)	*225*
		[$P = 0.209$]			[$P = 0.351$]	
Don't know	[40.0% (22.2–61.0%)]	[1.70 (0.73–3.94)]	*[20]*	[33.3% (7.7–75.0%)]	[2.31 (0.38–13.9)]	*[6]*
Child wearing a talisman/juju at interview[b]		$P = 0.434$			$P = 0.684$	
No	29.5% (24.0–35.7%)	1.00	*322*	18.5% (14.5–23.3%)	1.00	*372*
Yes	26.5% (20.8–33.1%)	0.86 (0.59–1.26)	*438*	17.0% (12.1–23.4%)	0.90 (0.55–1.49)	*392*
	Column % (95% CI)	OR (95% CI)	*Base*	Column % (95% CI)	OR (95% CI)	*Base*
Who else has given protection/treatment to child?[b]		$P = 0.195$			$P = 0.535$	
No-one	31.5% (25.5–38.1%)	1.24 (0.89–1.74)	*159*	19.5% (14.0–26.5%)	1.15 (0.72–1.84)	*140*
		$P = 0.467$			$P = 0.214$	
Herbalist	31.8% (20.4–45.9%)	1.23 (0.70–2.17)	*66*	11.8% (6.1–21.8%)	0.59 (0.26–1.37)	*84*
		$P = 0.089$			$P = 0.439$	
MRC	21.8% (14.7–31.0%)	0.66 (0.41–1.07)	*170*	16.4% (12.4–21.4%)	0.85 (0.55–1.31)	*321*
		$P = 0.627$			$P = 0.983$	
Marabout	26.8% (20.5–34.3%)	0.91 (0.63–1.33)	*291*	17.7% (12.2–25.0%)	0.99 (0.59–1.67)	*277*
		$P = 0.081$			$P = 0.521$	
Elderly woman/man	22.3% (16.0–30.2%)	0.68 (0.44–1.05)	*175*	16.1% (10.7–23.55)	0.86 (0.53–1.39)	*200*
		$P = 0.054$			$P = 0.440$	
Family doctor/private clinic	31.6% (25.2–38.9%)	1.32 (1.00–1.75)	*256*	12.5% (4.4–30.5%)	0.64 (0.20–2.05)	*64*
		$P = 0.543$			$P = 0.609$	
Other	31.9% (19.3–47.9%)	1.23 (0.62–2.42)	*47*	14.3% (5.3–33.2%)	0.76 (0.26–2.22)	*48*
		[$P = 0.512$]			[–]	
Don't know	[50.0% (5.1–94.9%)]	[2.59 (0.14–48.1)]	*[2]*	[0.0%]	[–]	*[2]*
What are the main problems with the IWC?[b]		$P = 0.881$			$P = 0.646$	
No problems	27.2% (22.7–32.3%)	1.03 (0.72–1.46)	*481*	18.2% (14.3–22.8%)	1.12 (0.68–1.84)	*451*
		[$P = 0.219$]			$P = 0.314$	
Travel problems	[15.0% (5.2–36.3%)]	[0.47 (0.14–1.60)]	[*20*]	14.0% (8.0–23.3%)	0.70 (0.37–1.38)	*129*
		[$P = 0.8807$]			$P = 0.296$	
Effects of sun/rain in travel	[33.3% (10.4–68.2%)]	[1.35 (0.31–5.91)]	[*6*]	14.0% (9.0–21.0%)	0.75 (0.43–1.30)	*45*
		$P = 0.306$			$P = 0.662$	

Crowds, long waits	30.1% (22.4–39.0%)	1.21 (0.83–1.76)	*163*	16.2% (10.5–24.2%)	0.89 (0.51–1.55)	*153*
Bad people or witches	0.0%	– –	[*2*]			*0*
Disrespectful staff	20.6% (12.6–31.7%)	$P=0.158$ 0.68 (0.39–1.17)	*68*	[6.3% (0.7–38.5%)]	[$P=0.279$] [0.31 (0.03–2.72)]	[*17*]
Financial problems	27.0% (13.4–47.1%)	$P=0.997$ 1.00 (0.44–2.29)	*37*	[31.6% (13.8–57.2%)]	[$P=0.129$] [2.23 (0.78–6.36)]	[*22*]
Link with family planning	– –	– –	*0*	– –	– –	*0*
Discouragement from husband or family	– –	– –	*0*	– –	– –	*0*

[a]Defined as date of measles vaccination more than 12 months after date of birth.
[b]Respondents could report more than one response.
[c]Among respondents who reported that they were currently married.

the same neighbourhood or ethnic group, but others attended alone. Observation and narratives suggested that some mothers felt excluded and worried by the clinic crowds; especially mothers who were poorer, recent immigrants, who lacked fine clothes or had thin babies who might provoke others' moral disapproval.

The narratives of urban mothers in the survey also revealed a strong view that prior social connections with clinic staff and strong integration with other women could lead to privileged treatment, while lacking such connections could provoke exclusion. For example:

> 'I know some nurses, as such I don't even stand at queues, they attend to me without delay';
>
> 'They segregated we [area X, of recent immigrants]. The health centre workers give more attention to women from [area Y, largely long-term residents]';
>
> 'My first day in the clinic was very discouraging. I encountered a long delay due to favouritism. The nurses attended to people according to relations and friendship. I went to the clinic much earlier than most mothers, but most mothers were attended to before me. I consequently got discouraged about the system.'

The survey figures confirmed that more urban than rural mothers experienced problems with crowds and long waits at the clinic (Table 6).

Mothers in the rural east had very few complaints about their interactions with clinic staff, and almost all described nurses as helpful and respectful. In the urban west, views were much more variable, suggesting markedly different social experiences amongst different mothers (and perhaps, between clinics). Women were asked about their first experiences of attending clinic, and the association with BCG default was explored. In the urban district, 16.8% of women who reported that staff were friendly/respectful were BCG defaulters, in contrast to 24.0% of urban women who disagreed with the statement that staff were friendly [$P=0.0217$, OR: 0.64 (0.44–0.94)]. We categorized women into those who 'said staff were friendly/respectful', 'said staff were rude/embarrassed me', or 'didn't say either way'. Overall, among urban women there was no significant difference in the proportion who were BCG defaulters ($P=0.1152$). However, urban women who 'said staff were friendly/respectful' were significantly less likely to be BCG defaulters relative to urban women who 'didn't say either way' (OR: 0.64, 0.44–0.92, $P=0.019$). And urban women who 'said staff were friendly/respectful' were borderline significantly less likely to be BCG defaulters relative to urban women who said 'staff were rude/embarrassed me' ($P=0.0652$), while no statistically significant result was observed for rural women.

We explored survey data on the reporting of 'no problems' at the IWC in this setting in relation to poverty indicators. No association was found between the reporting of 'no problems' at the time of attending clinic and the

Table 7. Association between number of occasions of defaulting, by district

	District	
	Urban/peri-urban Column % (95% CI)	Rural Column % (95% CI)
Number of times a defaulter		
	Denominator = 761	*Denominator = 763*
0 (none)	37.8% (32.4–43.6%)	55.9% (51.7–60.1%)
1	31.1% (27.8–34.7%)	29.8% (26.7–33.1%)
2	23.7% (20.0–27.7%)	10.5% (8.7–12.5%)
3 (all)	7.4% (5.5–9.7%)	3.8% (2.6–5.5%)
Total	100.0%	100.0%
Of defaulters who default only once		
	Denominator = 237	*Denominator = 228*
% BCG defaulters (only)	17.3% (12.5–23.4%)	43.7% (36.2–51.4%)
% 3 month defaulters (only)	69.2% (63.0–74.8%)	34.7% (28.5–41.6%)
% measles defaulters (only)	13.5% (9.3–19.2%)	21.6% (16.6–27.6%)
Total	100.0%	100.0%
Of defaulters who default twice		
	Denominator = 180	*Denominator = 76*
% *not* BCG defaulters	60.0% (52.8–66.8%)	42.7% (32.9–53.1%)
% *not* 3 month defaulters	8.3% (4.7–14.4%)	28.0% (18.4–40.2%)
% *not* measles defaulters	31.7% (25.0–39.2%)	29.3% (19.6–41.4%)
Total	100.0%	100.0%
Of BCG defaulters		
	Denominator = 169	*Denominator = 168*
% who do not default again	24.3% (18.5–31.1%)	57.1% (50.6–63.3%)
% who default at 3 month vaccinations (only)	33.7% (26.8–41.5%)	13.5% (8.8–20.1%)
% who default at measles vaccination (only)	8.9% (5.1–15.0%)	12.9% (8.3–19.5%)
% who default at 3 month vaccinations *and* measles vaccination	33.1% (26.1–41.0%)	16.6% (11.5–23.4%)
Total	100.0%	100.0%
Of 3 month vaccination defaulters		
	Denominator = 385	*Denominator = 163*
% who default at measles vaccination (only)	42.6% (37.6–47.8%)	38.1% (30.3–46.5%)

variables compound appearance, compound ownership, non-Mandinka ethnicity or mobile phone presence, despite their highly significant association with defaulting. By contrast, women who had more than 5 years of education were less likely to report 'no problems'. The complex relation between migration, poverty and the social factors supporting immunization in urban areas is not well captured by our questionnaire, as discussed below. We did not collect direct measures of migration.

Discussion and conclusions

Our survey and its supporting ethnography demonstrate a complex interaction between immunization knowledge, education, urbanization and the uptake of immunization. The determinants of, and experience of, immunization acceptance and default differ markedly between the urban and rural settings, with implications that will be increasingly important as the migration associated with urbanization across Africa continues. Conventionally-assumed patterns of higher rural default associated with problems of geographical access appear to be giving way to higher urban default associated with problems of socio-economic access and exclusion. At the same time, there was striking concordance in the assimilation of immunization to socially embedded, indigenous practices of child protection, which continued to contribute to the interpretations of both urban and more educated mothers. The study's findings raise challenges both for prevailing interpretations in the literature and for current policy approaches to improving immunization uptake.

Reflections on methodology

Our methodology, which combined participant observation, interview and focus group methods with quantitative surveys, offers advantages over the use of a single approach, while drawing attention to the limitations of both. Use of snowball sampling and key informants is open to 'information bias', due to its dependence on social structures determining access to, and links between, research participants. This was addressed through random selection of questionnaire respondents in the quantitative work, allowing us to estimate the extent and distribution of vaccination related behaviours, perceptions and attitudes, and thus to validate the claim of the ethnographic work to describe representative experiences. The quantitative survey, however, provided limited information and no new insights on the complex questions of the nature and significance of difficulties experienced in accessing and in using the IWC, contrasting with the rich emerging data provided through ethnographic study.

Types of demand, and the paradoxical roles of education

The study confirms that there are high levels of demand for vaccination in The Gambia, conforming to what Streefland et al. (1999) define as social demand, based on mothers' understandings of the general value of immunizations, of biomedicine and of clinic attendance. In both urban and rural areas, mothers perceive a general benefit from immunization that is compatible both with lay discourses and a variety of practices for protecting and promoting infant health. In contrast with the discourses of health professionals, high immunization uptake in the Gambia does not appear to be associated with a turn to western biomedicine at the expense of 'traditional' practices – rather the latter continue to be used in ways that complement and sometimes support IWC attendance. In rural areas (less so in the urban setting), social demand also reflects community processes (Nichter 1995; Samuelsen 2001) of routinization and orchestration based around women-centred social networks which encourage clinic attendance, and make it something of a social occasion.

However, our study provides little evidence for what Nichter (1995) defines as active demand by an informed public which perceives the need for specific vaccinations. Parents do actively seek vaccination, but based on cultural understandings of what vaccinations do rather than on biomedical disease-specific knowledge. We term this culturally-grounded active demand, and suggest it as a further necessary category in understanding vaccination demand issues.

In contrast with the frequent assumptions of health care professionals and with other literature focused on African settings (e.g. Onuoha 1981; Cleland and Van Ginneken 1988; Bicego and Boerma 1993; Helman and Yogeswaran 2004), we find that level of maternal education is not an important determinant of vaccination acceptance in The Gambia. Education is associated with increased disease-specific knowledge, but also with an increase in *incorrect* 'knowledge', while the increased uptake associated with education in urban areas may just be confounding with economic factors. Other studies in The Gambia (Barrett and Browne 1996) have similarly shown that where affordable and accessible primary health care is available, maternal education has little impact on uptake of services and that its effects on health-seeking practices are often overshadowed by the effects of women's social relations in compounds and health centres. It is not plausible in this setting that maternal education and biomedical knowledge are key to achieving high immunization uptake.

However, the study also indicates the potential for conflict between social demand and the vaccination schedule. Some mothers think that their children are fully vaccinated when they are not, if within their timing-related understandings late DTP has overlapped with the scheduled timing of measles, or perhaps if they have 'counted' injections given for treatment or additionally as part of National Immunization Days. Mothers sometimes also incorrectly think their children are protected against diseases that are actually non-immunizable.

The very high proportion of mothers 'incorrectly' reporting immunization against diarrhoea, malaria and 'other small diseases' warrants further attention. Several factors may be at play. First, mothers' reports of increased resilience to these diseases, and of the general effects of immunization in improving health, are in line with the findings of Aaby (1995) and Aaby and Jensen (2005) concerning the non-specific effects of measles vaccines in neighbouring Guinea-Bissau, and should thus be read as less 'scientifically incorrect' than might first appear. Secondly, diarrhoea and malaria are frequently highlighted in IWC education sessions and practices (e.g. the dispensing of bednets and oral rehydration salts) and have come to be seen, by mothers, as part of a category of diseases that the IWC, which gives immunizations, deals with. Thirdly, the MRC has had a longstanding malaria research presence in The Gambia including, in the year preceding the survey, well-publicized trials of malaria vaccines.

In this setting, there is a risk that one-way Information, Education and Communication (IEC) approaches which promote biomedical, disease-specific views – a central plank in strategies to improve immunization uptake in many African countries, including The Gambia (PHPNP 2001) – will prove counter-productive, undermining mothers' confidence in the lay discourses and traditional practices that underlie social demand. Instead, our study's findings imply that communication should aim to build on existing social demand and culturally-grounded active demand, through dialogue-based approaches which appreciate mothers' existing views and work with them to build full appreciation of the vaccination schedule and when it is complete.

Default and social experiences of the clinic

The study found no evidence in these Gambian settings of vaccination non-uptake being associated with refusal of or resistance to vaccinations, either on an individual or community basis (Streefland et al. 1999). Rather, given overall demand, default or lateness usually reflects parents' willingness, but inability, to take their children for vaccination.

In the rural setting, this ability does not reflect any particular social factors: instances of default are rather linked to haphazard events ranging from day-to-day problems and family issues to supply problems at the clinic. Default for one or another immunization is little associated with overall schedule non-completion.

In contrast, in the urban setting, default is linked with poverty-related factors and default on one immunization seems to set a pattern for further default. This relationship between poverty and default is unlikely to reflect poorer mothers' inability to pay costs associated with

vaccination: the service is free, with a nominal sum charged for antenatal cards changed at birth for the child's health card, while transport costs are minimal in clinic-accessible urban areas. Our ethnography suggests, rather, that poorer immigrant mothers are often more taken up with multiple livelihood activities and travel that deter clinic attendance, while they often experience exclusion from the social networks that encourage and routinize clinic attendance for most. Our ethnographic findings in relation to social experiences at the clinic, discrimination by nurses and worries about the weighing scales and evil eyes underline that in the urban context, infant welfare clinics can be places of social exclusion and worry for those who are less well-integrated. This points to emerging circumstances in rapidly urbanizing areas that are likely to become more important across Africa.

Our findings indicate a need for improved and targeted services in the urban setting. Late first vaccinations in urban areas herald later general defaulting, while default is itself associated with poverty-related variables which will generate a variety of health inequalities. It is important from a health policy point of view to keep these poorer mothers and children in the system, and therefore it is particularly important that they should be welcomed and treated with respect during early clinic visits, in order that they have as positive an experience as possible.

Other studies in Africa have identified staff rudeness and attitudes as a problem (Streefland et al. 1999; Helman and Yogeswaran 2004), often one linked to their low pay and incentives, as well as their training and self-definition as bearers and transmitters of superior western biomedicine. If urban mothers' experiences are to be addressed, it will be important for health service policymakers and managers to work with clinic staff to help them understand social relational reasons for vaccination default – in mothers' poverty, social exclusion, lack of networks and feelings of being uncomfortable or marginalized at clinic. At the same time, the study has identified the importance of the routinized and social role of the IWC in rural areas and for some urban women through social structures supporting group 'outings'. The potential for involving poorer and immigrant urban women in this way, using a community development approach to support their access to and social experiences of health services, needs to be explored.

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