Outcomes of Delivery Systems for ITNs: Attributing Coverage through a Household Survey in Ghana

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Background

Mosquito nets and insecticide-treated nets (ITNs) for malaria prevention have been delivered through a wide range of systems, in both public and private sectors and mixes of the two. Despite considerable debate on which system or combination of systems is most effective, no rigorous comparisons have been undertaken, and the debates are therefore not evidence based. We use data from a household survey in Ghana to develop a simple method of assessing the relative effectiveness of ITN delivery systems.

Methodology

Survey Methodology

• NetMark with funding from the United States Agency for International Development (USAID), conducted a household survey on ITNs in Ghana in 2004. The sample of 1,500 was divided equally among five sites – Accra in Greater Accra Region, Keta in Volta Region, Kumasi in Ashanti Region, Wa in Upper West Region, and Tamale in Northern Region – with 40% from the urban centre and 60% from rural areas up to 200km away. Respondents were women aged 15 – 49 who cared for at least one child under five.

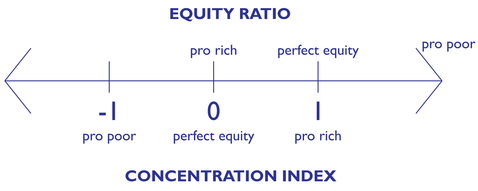
Categorizing delivery systems

• We reviewed systems used for delivering nets and ITNs in Ghana and used a categorisation of net and ITN delivery systems developed by one of the authors (Webster, et al., In press) to tabulate the systems identified. This categorisation allowed us to retrospectively identify defining characteristics of the delivery systems based on questions included in the household survey. In order to do this we developed the table of delivery systems into a matrix of delivery sector and delivery channel by source of net, cost to the end user and net type.

• Responses to survey questions about nets were used to link nets to the delivery sector (public, public-private, private, community) through which the net reached the household.

Measures of equity

• The NetMark survey used questions on ownership of assets, household characteristics, and level of education, together with principle components analysis, to divide households into socio-economic quintiles. We used the equity ratio and concentration index (CI) to compare coverage across socio-economic quintiles through these delivery systems.



• The equity ratio compares coverage in the poorest and least poor quintiles. An equity ratio of 1 is perfect equity; 0 is the highest level of pro-rich bias, and increasing pro-poor bias is on a rising scale above 1.

• The concentration index incorporates all quintiles to measure the degree to which net ownership is concentrated in richer (or poorer) households. A CI of 0 is perfect equity; 1 is the highest level of pro-rich bias, and -1 is the highest

Results

Net/ITN delivery systems in Ghana

• Nets and ITNs have been delivered through a variety of channels in Ghana, all at a sub-national level and some of short duration. (See Table 1.)

Sample

• The survey identified 572 net-owning households with a total of 808 nets. Using responses about source of net and categorizing any remaining tailor-made nets as informal commercial, we were able to match 95% of nets to the delivery system through which they reached the household.

Coverage by delivery system and by site

• Overall, 38% of households owned a net, and 25% of children under 5 and 21% of pregnant women slept under a net the previous night. Just over half of the households with at least one net (57%, or 21% of all households) had a net from the private sector, with the majority from the informal private sector (see Figure 1). A variety of public sector delivery systems account for most of the other nets in households. Net use by vulnerable groups followed a similar pattern (see Figure 2).

• Levels of ownership and use of nets varied between survey sites and the delivery sector contributing to the greatest coverage also varied (see Table 2). Ownership and use was highest in Keta, with most coverage attributable to the informal private sector. Conversely, in Wa and Tamale, the public sector had the greatest impact.

Equity of coverage by delivery channel

• The socioeconomic disparities in coverage through the public and private sectors were comparable. However, coverage with nets obtained through informal commercial sources was more equitable than through either formal commercial sources or routine services (see Table 3).

Conclusions

• We demonstrated that survey questions on source of net can be used to match nets in households to the sector through which they were delivered and therefore assess the relative effectiveness of different delivery systems.

• Attributing coverage measured in household surveys to specific delivery systems could provide the evidence base needed to inform international debates on the most effective and equitable systems for delivering ITNs to target groups. However, as our results show in Ghana, delivery systems may be more or less effective in different locations and thus multiple, complementary approaches are likely to be necessary.

Webster, J., Hill, J., Lines, J., Hanson, K. Delivery systems for insecticide treated and untreated mosquito nets in Africa: categorisation and outcomes achieved *In press.*

Table 1: Matrix of net and ITN delivery categories by defining characteristics in Ghana

Delivery Category				Defining characteristics	
Delivery sector	**Delivery Channel**		**Region of Implementation**	**Source/delivery point**	**Cost to the end user (Ghanian cedis)**
Public	Routine services	ANC/EPI/MCH/Child clinics	All 10 regions - selected districts	Clinic	20,000
		Intervention packages	Upper East - all districts Northern 4 districts	Clinic, community	5,000 pregnant women and <5s 20,000 others
	Campaigns	Measles	Upper West - 1 district	Clinic, outreach	Free
		Polio NIDs	Central Region	Clinic, outreach	20,000
Public-private	Voucher scheme	Routine service - retail	Volta - 11/12 districts	Pharmacies, chemical sellers, shops	Various (+ use voucher question)
Private	Social Marketing	Retail outlets	National - ended in 2003?	Pharmacies, chemical sellers, shops	Various
	Commercial sector	Formal Sector	Extent unknown	Pharmacies, chemical sellers, shops	Various
		Informal Sector	Extent unknown	Markets, itinerant traders, kiosks	Various
Community-based	Community-based	Community (CBOs, NGOs)	Extent unknown	Community	Unknown

Table 2: Net coverage achieved by public-private, and private delivery sectors by survey site

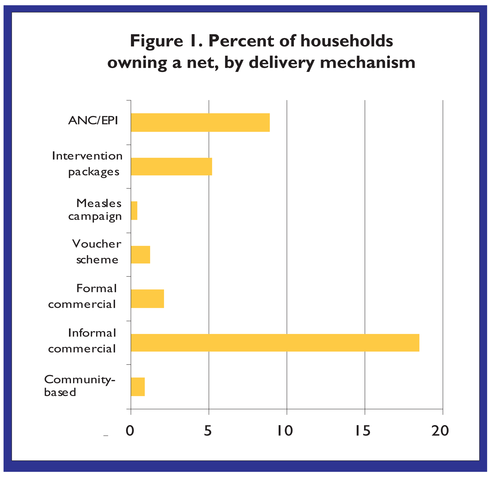
Delivery Sector	Households with at least 1 net* (%)					Under 5s slept under a net (%)					Women of reproductive age slept under a net (%)				
	Accra	Keta	Kumasi	Wa	Tamale	Accra	Keta	Kumasi	Wa	Tamale	Accra	Keta	Kumasi	Wa	Tamale
n	301	301	300	299	299	400	373	446	378	411	422	403	456	411	379
Public	6.3	8.3	5.6	23.8	35.1	3.1	4.6	4.0	14.6	24.3	1.8	4.4	3.0	13.0	21.5
Public-private	0.0	3.3	0.7	1.7	0.3	0.0	2.9	0.2	0.3	0.2	0.0	2.0	0.4	0.5	0.3
Private	9.9	54.2	11.0	18.0	10.7	6.0	37.6	6.3	11.4	6.3	5.1	38.2	5.7	9.0	6.6
Community	0.0	2.7	0.7	0.7	0.3	0.0	0.8	0.4	0.8	0.2	0.0	1.5	0.2	0.5	0.3
Unknown**	2.0	3.0	1.6	0.7	1.0	0.8	1.3	1.3	0.8	1.4	1.0	1.2	0.9	0.7	1.9

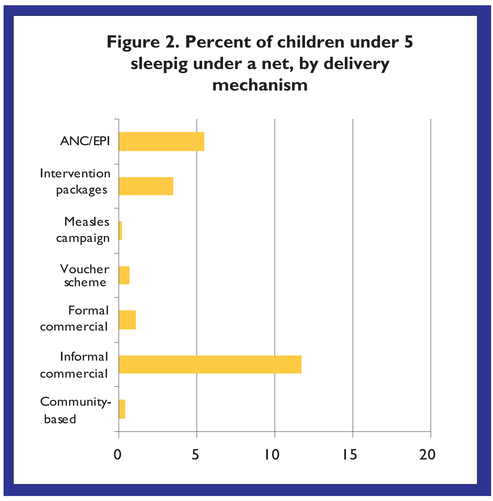
* Households are included for each net from ech different souce therefore may be doubly or multiply counted
** Includes gift

Table 3: Coverage and equity of coverage of any net achieved by public, public-private, and private delivery sectors across the 5 survey sites

Delivery Sector	Households with at least 1 net*				Under 5s slept under a net				Women of reproductive age slept under a net			
	n	%	Equity Ratio	CI	n	%	Equity Ratio	CI	n	%	Equity Ratio	CI
Public	237	15.8	1.21	-0.056	202	10.0	1.34	-0.067	175	11.4	1.78	-0.130
Public-private	18	1.2	0.11	0.433	14	0.7	x	0.506	13	0.6	x	0.547
Formal Commercial	32	2.1	x	0.566	22	1.1	x	0.654	20	1.0	x	0.599
Informal Commercial	277	18.5	1.34	-0.046	235	11.7	1.78	-0.098	242	11.7	1.85	-0.105
Community	13	0.9	1.00	-0.001	9	0.4	1.8	-0.259	10	0.5	0.56	-0.098
Unknown**	34	3.3	0.68	0.101	23	1.1	0.38	0.158	23	1.1	0.44	0.173

* Households are included for each net from ech different souce therefore may be doubly or multiply counted
** Includes gift
x 0 in the poorest quintile





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