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HEALTH ECONOMICS &
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**Targeting Subsidies for Insecticide Treated
Mosquito Nets (ITNs):
A conceptual framework, experience from other
sectors and lessons for ITNs**

Eve Worrall[†], Virginia Wiseman[‡] and Kara Hanson[†]

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[†]Health Economics and Financing Programme, Department of Public Health and Policy,
London School of Hygiene and Tropical Medicine

[‡] Gates Malaria Partnership, London School of Hygiene and Tropical Medicine

INTRODUCTION

A number of interventions for preventing and treating malaria have now been shown through a combination of clinical trials and economic analysis to be highly cost-effective (Goodman, Coleman et al. 1999; Goodman, Coleman et al. 2000). The attention of national governments, together with their donor partners working through the Roll-Back Malaria Initiative, is now focused on how to achieve high levels of coverage of key interventions. In the context of Insecticide Treated Nets (ITNs), this raises a number of challenges. Two critical issues currently being debated in policy and academic circles are: (i) how to ensure that, in addition to addressing efficiency concerns through the provision of cost-effective programmes, the most vulnerable groups are given priority in the distribution of ITNs; and (ii) the relationship between public and private sectors and the implications for the sustainable delivery of ITNs.

An equitable expansion of ITN coverage requires that public resources be devoted to supplying those who cannot afford to buy nets at commercial prices. This poses a dilemma, however, in that the widespread availability of subsidised products will discourage the private sector from selling in the market, potentially compromising the achievement of other policy goals such as efficiency and sustainability. Reconciling the two approaches in order to successfully “segment” the market therefore requires that subsidised products be *targeted*, by which we mean, transferred to a particular sub-group of the population. In contrast to the encouragement of the private sector, considerably less progress has been made in defining this side of the segmentation strategy: who should receive subsidised nets; at what level of subsidy; and how should they be delivered.

The aim of this paper is to develop a framework for describing and assessing alternative approaches to targeting subsidies based on a review of the evidence about targeting both within and outside the health care sector. Using this framework, we compare the advantages and disadvantages of a targeted versus untargeted approach to subsidising ITNs and then compare alternative targeting strategies in order to inform policies and programmes aimed at targeting subsidised ITNs. Specifically, we wish to address the following questions:

- (i) Why target? The key goals and advantages of targeting;
- (ii) What to target? The nature and choice of the good or service to be targeted;
- (iii) Who to target? The choice of the target group;

- (iv) How to target? The mechanism and delivery channels for the subsidy ; and
- (v) What are the relevant criteria for evaluating targeting programmes?

BACKGROUND

The literature on targeting has emerged from a number of different fields, including poverty, welfare, education, nutrition and health. Consequently, the language and concepts used to describe targeting are varied and occasionally confusing. One aim of this paper is to propose a unifying terminology that can be applied to issues of targeting malaria interventions. In this section we develop working definitions of a number of terms which are used to describe the targeting process.

For the purposes of this review, targeting is defined in general terms as a process for transferring resources to a sub-group of the population. It involves the identification and selection of certain groups, households or even individuals and the distribution of benefits to them (Mooij 1999).

1. CONCEPTUAL FRAMEWORK

1.1 Why target? The key goals and advantages of targeting

Before designing or evaluating a targeting strategy it is important to be clear about its objectives. Atkinson (1995) points out that arguments in favour of targeting are too often based on implicit assumptions about the nature of objectives without explicit and critical examination of the objectives of the policy, the range of instruments available to attain those objectives, and the economic, political and social constraints under which policy has to operate. A key reason why some targeting strategies fail to improve the socio-economic status or health status of the poor for example, is that they were never designed to do so. In order that targeting strategies achieve their intended goals, these must be kept foremost in the minds of those designing and implementing the strategy. Such goals and any unintentional consequences of targeting policies will also be a crucial benchmark against which to evaluate the success or failure of the intervention.

There are a number of reasons why policy makers may decide to target a subsidy. These can be broadly categorised as relating to equity, efficiency and sustainability. Unless otherwise stated, for the purposes of this paper targeting is compared to the benchmark of an untargeted or universal subsidy.

Equity has commonly been cited as an objective of targeting transfers to the “poor” or the “vulnerable”, and targeted social provisions to these groups has been advocated by international agencies and national governments for many years. In the context of health care financing, it has been argued that “targeting [exemptions from user fees] permits the poor to benefit disproportionately from public health care financed by user fees” (Gilson, Russell et al. 1995). Similarly, it has been argued that the “over-riding objective” of many food interventions is to “transfer incomes to poor households” (Cornia and Stewart 1993). Targeting has also been used where women are known to be particularly disadvantaged. For example, an education voucher system was targeted at girls in Bangladesh (King and Elliot 1993) and credit or micro finance schemes are often targeted at or exclusively designed to serve women.

Many find the equity justification for targeting appealing insofar as it provides both a means of reducing the costs of a particular intervention, while at the same time increasing its

effectiveness (Mooij 1999). It is seen as a way to reallocate scarce resources to the poor and vulnerable, which increases the effective use of resources. It may also reduce the total cost of the intervention; however some commentators have noted that, in reality, this may not be the case (Besley and Kanbur 1993).

This hints at another objective of targeting, which is rooted in concerns about efficiency. There are two related elements to the efficiency argument. The first is that with limited resources available for subsidies, channelling them directly to those most in need or most able to benefit, for example pregnant women and children under five in the case of ITNs or sex workers in the case of condoms for STD control, will ensure that they are most efficiently used. This argument is based on the assumption that the cost of reaching all individuals is the same but that certain groups will gain more than others from each unit of subsidy. In a similar vein, the World Bank claims that “the social returns for a given level of benefits are higher for the poor than for the wealthy ... targeting can improve programme efficiency and save resources by concentrating expenditures on those who need them most” (Alderman and Lindert 1998).

The second efficiency issue is that targeting may help to avoid inefficient subsidies. A subsidy is inefficient if it provides a good or service to an individual which they would have purchased themselves at the unsubsidised price. Targeting may be used to avoid this inefficiency by focussing on the poor or those who do not have access to the good or service being subsidised. Efficiency may be further improved if resources are used to induce a desired action, such as purchasing and using a public health product which has positive externalities¹.

For a targeting strategy to be considered effective it must achieve lasting and sustainable benefits. The sustainability of a targeting strategy may be crucial to its long term success and may therefore be an objective in itself or at least an important element in the overall targeting strategy. There are a number of sustainability issues that may be important depending on the particular targeting strategy. Political sustainability depends upon a continued political commitment and support for targeting. This must come from both those who may not directly benefit from the subsidy but who have the political power to undermine it, and from the

¹ An externality is a direct effect of the actions of one person or firm on the welfare of another person or firm, in a way that is not transmitted by market prices (Katz, M. L. and H. S. Rosen (1994). Microeconomics. Illinois, Irwin.)

communities and individuals in the target group who must perceive a real benefit in order to remain involved. Setting a broader target may be necessary to “buy off” potential opponents of a narrowly-targeted scheme and avoid social division. Fiscal sustainability will be an issue in most targeting strategies particularly those which require ongoing donor or government support to cover the costs of the targeting strategy and the cost of the subsidy itself.

The advantages of targeting compared to universal resource transfers in terms of their sustainability are two fold. Firstly, they will reduce the number of people to be served which will either reduce the cost of the subsidy or allow a greater level of subsidy to be given to each recipient (in the target group). Secondly, the reduction of price and other market distortions may help to improve the sustainability of benefits. For example, one argument for targeted subsidies on ITNs is to encourage sustainable private supply by minimising the degree of “crowding out” of the private sector which may occur with untargeted subsidies. Sustainable private supply of ITNs is important to ensure that those who can afford to purchase ITNs have access to competitive private markets and therefore will be less likely to access subsidised nets intended for the poor or other vulnerable groups.

Sustainability is also influenced by the level of community involvement and commitment to the targeted intervention. Where community level mechanisms exist for identifying and helping those considered needy, it is important that any external system respects and complements such systems. The process of communication between policy makers and communities in designing an appropriate targeting strategy may help build relationships and partnerships which may be of value not only to the issue in question but also are of value *per se*. A number of arguments have been raised in the broader community participation literature. Of particular relevance to this review are those arguments that focus on the value of the participatory *process*. It has been suggested that public participation can be an end in its own right, in addition to the value of the outcome *per se* (Vuori 1984; Hughes and Larson 1991). For example, public involvement in health care planning and evaluation is claimed to enhance ‘self determination’ which is viewed by many health policy commentators to be a basic prerequisite for the achievement of equity (Wiseman, Mooney et al. 2003). Moreover, the call for public participation has also been driven by concerns over who has the ‘democratic right’ to make decisions about programmes and activities that directly impact upon community members. The World Health Organization has argued that: ‘The people have

the right and duty to participate individually and collectively in the planning and implementation of their health care' (Anonymous 1978).

In reality the objectives of a particular targeting programme are likely to be multiple and include more than one of those described above. However, designing a strategy which meets all of those objectives will necessarily be an exercise in managing trade-offs. The trade-off between efficiency and equity goals is discussed in more detail on in section 2.3.

1.2 What to target? The nature and choice of the good to be targeted.

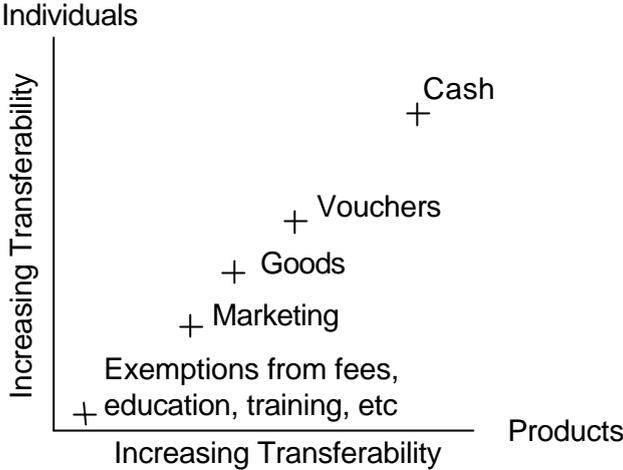
The choice of what to subsidise will obviously be programme specific and will depend on the objectives of the particular policy but will also have implications for the design of the targeting strategy. A targeted subsidy can be applied to goods (including cash), services, and marketing².

It is useful to consider the types of resources in terms of whether they are transferable or non-transferable; firstly, between individuals and secondly, between products (figure 1). In terms of transferability between individuals, we can think of a continuum starting with cash which is the most transferable, through to vouchers ("tied" or non-liquid cash) and goods which may be less transferable, at the other end of the continuum are non-transferable items for example services such as education, health and training or reductions/exemptions from payment for goods and services³. The degree of transferability between products follows a similar pattern with cash transfers allowing the largest choice between commodities. While they are intended to be tied to specific products, in practice vouchers may be transferred away from the intended product depending on the strength of systems in place to prevent them being exchanged for items which they were not intended. Once purchased, goods may be exchanged or traded for cash or other items. It is less likely that targeted subsidies on services could be diverted towards other products.

² Marketing may be specifically targeted as a product in its own right, but it is also likely to play an important role in reinforcing the targeting of any other product.

³The benefits of education, health care and training may be transferable to some extent, for example if they improve a persons ability to earn resources which can then be transferred to her family.

Figure 1 Transferability between individuals and products



Targeted marketing may be used to maximise the effectiveness of other targeting strategies through an information and education campaign. However, it can be used as a targeting tool in its own right, for example concentrating marketing and promotion efforts through specific media which are known to be accessed more by the target group, or through a marketing campaign designed to appeal to a specific sub-group of the population such as adolescents. Targeted marketing may be transferable or non-transferable between individuals depending on the extent to which the information aspect of marketing is passed on to individuals outside the target group. However, the key point here is that information is “non-rival” in consumption which means that the value of information does not diminish when transferred to other individuals (unless a misinterpreted message is transferred). The transferability of targeted marketing is likely to be limited between different product groups, but the promotion of a particular brand of product may increase demand for alternative brands of the same product. Generic advertising (e.g. non-brand specific marketing promoting condom or ITN use) may also be targeted to particular population subgroups.

Economic theory suggests that individual utility is maximised when the transfer takes the form of cash. However, cash transfers in developing countries are rare, perhaps because of concerns about accountability and fungibility (i.e. that cash transfers for what donors consider desirable commodities may simply replace, rather than add to total expenditure on these

items). Exemptions from fees or reduced fees for merit goods⁴ such as health and education services are more common, as are subsidies (full or partial) on physical commodities such as food or mosquito nets.

The nature and type of good being transferred has implications for how well the transfer reaches and stays with its intended recipient. For example, goods that can be used by others in the household or community, or which have a market value and therefore can be sold, are less likely to “stick” to the target group. This has implications for monitoring and evaluation, which may need to be continued beyond the initial transfer of resources to examine intra-household use of goods.

1.3 Who to target? The choice of the target group

Deciding who should be reached by a targeted intervention will clearly depend upon the objectives of the intervention, which will determine what is being targeted.

Generally speaking, if improved equity is the policy objective the target group will be the disadvantaged. These may be defined as the poor, high risk groups or the socially excluded. If maximum efficiency is the policy goal then the target group should be defined as those most able to benefit from the chosen subsidy (high risk groups or the vulnerable) and those who would not otherwise (without the subsidy) have access to the good/service (the poor or those with limited access). The complexity of the notion of vulnerability in different sectors is discussed in the literature. For example, in the context of humanitarian assistance programmes, Jaspars and Shoham (1999) have identified a number of key target groups including those who are physiologically vulnerable, socially vulnerable, economically vulnerable, and politically vulnerable. However, such target groups are extremely broad and identifying the vulnerable in a specific context requires careful analysis of the types of risks people face, and the means they have to cope with them (Jaspars and Shoham 1999).

⁴ The category of merit goods is an *ex post* justification for public spending on items which do not suffer from the conventional market failures. These are defined almost by default as “those other goods and services which people feel ought to be available to all”. It should be noted that this default category has no theoretical basis, but is designed to provide some explanation for the actual behaviour of governments Culyer, A. J. (1989). "The normative economics of health care finance and provision." Oxford Review of Economic Policy 5(1): 34-58.

In order to achieve maximum (financial) sustainability the target group and value of the subsidy must be kept to a minimum whilst still achieving the other programme objectives. Leakage of the subsidy outside the target group must also be avoided to prevent market distortions and to maintain political support for the programme⁵.

1.4 How to target? The mechanism and delivery channel for the subsidy

The mechanism and delivery channel for the subsidy is essentially the means by which the “what” and the “who” are brought together. Three discrete types of mechanism can be identified, however, in practice, most targeting strategies will be of a “mixed” nature, blending features of demand-led, supply-led and community-led mechanisms.

1.4.1 Demand-led targeting

When factors on the demand side are used to achieve the desired (targeted) allocation of resources the mechanism can be described as demand-led targeting. Generally in demand-led targeting the subsidy is available to all but the target population “self selects” and the non-target population remains outside the programme. Hanson, Kumaranayake et al. (2001) have defined the demand-led approach as “segmenting the market through price or other service characteristic which, by having users choose services based on their preferences and willingness and ability to pay, distributes service users in a way which maximises coverage [of] and minimises leakage [from the target group]”.

Market segmentation on the basis of price is used in the supply of condoms where the availability of higher-priced brands, offering higher status, is said to allow “the non-poor to purchase higher-priced goods while still letting the poor choose (almost) free brands” (Thomas, Killingsworth et al. 1998). Quality differentiation has also been used to segment the market and attract a particular target group. For example, in relief efforts food subsidies may be shifted towards dark, rough flour or yellow maize meal that is consumed disproportionately by the poor and shunned by the rich (Alderman and Lindert 1998).

Differentiation on the basis of the quantity of a good supplied can also be used. For example the small loans involved in micro-credit schemes offer a means of segmenting the market

⁵ Note: for definition and further discussion of the concept of leakage, see section 1.5 on evaluation criteria

since it will only be worthwhile for the poor to borrow such small amounts of cash. Alternatively, self-targeting may be achieved by making the process by which a good or service is acquired the means for self-selection. For example, subsidised goods may be available only to those individuals who are willing to wait in lines or be stigmatised as poor (e.g. shop in a ration store, see Alderman and Lindert (1998)). Attempts to attract the relatively well off in to higher priced services have also been made, for example a higher price health service may allow patients to be “fast-tracked” so that the quality of medical care does not differ, but the length of the time spent in the queue does (Thomas, Killingsworth et al. 1998).

Marketing strategies are often used to reinforce market segmentation approaches for example by reinforcing perceptions of the nature of the target group for each brand of a product. For example marketing may be used to reinforce the perception that a particular subsidised product such as a particular brand of mosquito net aimed at young children should only be used by this group.

The main advantage of demand led targeting is that by relying on individual decision making, it is likely to require a smaller administrative superstructure to support its operation. There are, however, a number of potential barriers and problems with demand led targeting which have been described in the literature (see for example Thomas, Killingsworth et al. (1998); Swaminathan 2000; Zimmerman (2000)). The costs of accessing the subsidy such as time, travel or cost-sharing may prevent some of the target group from being able to benefit. A lack of adequate knowledge or information about entitlement, availability and access among the target group may also lead to under-coverage. Problems of asymmetric information⁶ may occur if the target group cannot perceive or understand how to determine the quality of a product or choose the right product for their particular needs. In health care this may lead to the target group receiving a lower quality of care or deter them from accessing subsidised care because they consider it to be inferior or second class. Finally, the market segmentation necessary to use demand led targeting strategies may lead to the stigmatisation of the intended target group.

⁶ Asymmetric information refers to a situation in which one side of an economic relationship has better information than the other.

1.4.2 Supply-led targeting

When factors on the supply side are used to achieve the desired allocation of resources the mechanism can be described as supply-led targeting. Supply led targeting involves the criteria for inclusion or exclusion being administered by the supply or delivery side.

Decisions over who should be reached by the strategy may be determined externally⁷ by a government or donor. External agents may also determine the criteria for identifying these individuals and the mechanisms for delivery. Alternatively, external agents may choose what is to be delivered (for example, food aid in a famine situation) and then allow the community to decide exactly who should receive the benefit and the appropriate delivery mechanism.⁸ In either case, some criteria will be needed to identify eligible individuals, households or groups, based on the programme objectives. The characteristic of interest may be directly observable, for example a pregnant woman or young children in the household, or indirectly (not directly) observable for example, household income. When the characteristic of interest is not directly observable, external agents⁹ may use one or more proxy indicators to identify those who meet the targeting criteria (the eligible), and in some cases to exclude the ineligible. The relevant indicators will be determined by the nature of the target group. These may be geographical, socio-economic, demographic or health characteristics. They may be applied to individuals or households, or to whole communities.

Supply-led targeting using geographic indicators uses geographic location as a proxy for relative wealth or poverty, disease risks faced, or level of access to services. Geographic targeting implies “equi-distribution for all who are within the geographic unit of interest” (Jaspars and Shoham 1999). It is administratively simple and can often be carried out using existing data, making it relatively inexpensive (Baker and Grosh 1994). The level of under-coverage and leakage occurring with geographic targeting will depend on the size of the geographic unit used to administer the programme and the degree of homogeneity of the characteristic of interest (e.g. socio-economic status or health risk) within that unit (Mesoamerica Nutrition Program Targeting Study Group 2002).

⁷ External here refers to external to the intended beneficiaries.

⁸ This approach would be a hybrid of supply-led and community-led mechanisms.

⁹ See section on community based targeting for the case of internal agents observing the characteristic of interest.

Socio-economic indicators are generally used to provide an indication of the poverty or wealth status of individuals, households or communities, particularly for programmes aimed at poverty alleviation. Socio-economic status is multidimensional hence there is a vast number of indicators to choose from for use in the inference of socio-economic status. Generally, direct measurement of socio-economic status is likely to be labour intensive and costly to administer. It requires a large amount of information to be gathered, verified and processed and this process itself may exclude exactly those who it is intended to identify (Zaman 1998). There are also problems of setting “cut-off” points that distinguish the eligible from the ineligible. Indirect measurement is likely to be more feasible and less intrusive but will be less accurate than direct measurement. Seasonal income fluctuation, intra-community transfers and intra-household distribution issues add further difficulties to the measurement of socio-economic status.

1.4.2.1 Vouchers for targeting

Vouchers are placed under supply led targeting mechanisms since the criteria for deciding who receives the vouchers are normally on the supply side. However, they could also be considered ‘mixed’ since there is an element of self-selection (demand led decision) in deciding if, where and for what to redeem the voucher.

Vouchers were first suggested in the 1960’s as a way of funding education in the USA (Maynard 1975). Since then targeted and untargeted voucher systems have been used in the delivery of education, food and more recently, public health commodities. A voucher system works by placing additional resources at the disposal of the target group (demand side) in order to increase the quantity of the target good or service demanded by that group. This increased demand may induce supply side changes which are discussed below. The vouchers may be distributed (targeted to a greater or lesser degree) by the government, NGOs or donors, or via an independent voucher agency. In some cases, self selection by the voucher holders may occur, so that those who redeem the voucher will be those most in need of the service offered, or least able to afford it without the voucher. Targeting vouchers towards the poor¹⁰ and thus transferring effective demand to them may help improve equity by improving the choice, quantity and/or quality of goods or services available to them. It should be noted however, that compared to cash transfers, vouchers limit consumer choice. Efficiency gains

¹⁰ Note: it may also be possible to vary the value or benefits of the voucher for different sub-groups of the population.

can be made by targeting the distribution of vouchers to high risk groups (those with the greatest capacity to benefit) or using them to increase usage of merit goods such as ITNs and condoms. Increased efficiency will depend upon the information available to the target group and may be eroded by administrative costs of the voucher system.

Gorter (2003) distinguishes between competitive and non-competitive voucher schemes. Non-competitive voucher schemes are described as those where there is just one provider of the commodity/service, or, very few suppliers distributed over a large area or population. Competitive voucher schemes are those where there is a number of providers of the good or service such that competition for the resources embodied in the vouchers is expected to arise.

Competitive voucher schemes may help to increase competition on the supply side by encouraging new entrants (encouraged into the market by the increase in demand) which in turn may help to keep prices down, quality high and the market more efficient. They may also encourage suppliers to specifically tailor products/services towards the voucher bearers in order to obtain a greater market share. It may be possible to induce further quality improvements through building in quality standards if contracting is used to select suppliers of the voucher goods or if limits are placed on the particular type or brand of product against which the voucher can be redeemed. This will require constant monitoring and may not be possible at all where informal or complex market structures exist. Attempting to build in quality standards through contracting or other means may also reduce supply, increase the search costs of the voucher holders who may find it difficult to find the authorised product, and encourage fraudulent exchange of vouchers.

Maynard (1975) identifies four key characteristics of voucher systems: the recipients, providers, benefits and value. The choice of recipients of the voucher (target group) may be universal, income based or based on analysis of capacity to benefit. Providers may be unlimited, which would increase access but may lead to concerns over the quality of the good or service on offer. Or they may be limited or restricted, perhaps with quality standards built in, possibly serving to reduce supply and therefore access. Similarly, the benefits (what they can be exchanged for) of vouchers can be used to promote choice (unrestricted benefits) or quality (exchange restricted to particular products). The value of vouchers may be used to increase demand, promote competition and improve efficiency. However, the higher the value of a voucher the higher the incentives for the non-target group to seek to obtain the

benefits thus leading to a higher risk of leakage. Managing the trade-offs between these conflicting goals through a voucher system is a key challenge.

Perhaps one aspect missing from Maynard's framework is a discussion of the voucher distributor or agency. As described previously, this may be the government, an NGO, or an independent voucher agency. The roles of this agency will be manifold, and may include: the design and printing of the voucher; the selection and identification of recipients; distribution of the voucher; contracting of suppliers; quality control; reimbursement of suppliers; monitoring and evaluation. Using existing government structures to carry out the role of the voucher agent may be a relatively low cost option compared to setting up an independent voucher agency and it will also benefit from nationwide distribution/coverage of government services. However it may lack independence, adequately trained and motivated personnel and accountability. Using an existing NGO or panel of NGOs as the voucher agent will benefit from the NGOs strengths in working with communities to identify recipients and distribute the voucher. NGOs are also likely to be accountable and trustworthy (which is important if suppliers are to be encouraged to participate in the scheme). However, many NGOs work only in specific parts or pockets of the country which may limit the potential for their use in a nationwide scheme. Both governments and NGOs may have incentives and goals which are not necessarily in line with those of the voucher scheme, which may compromise the system. An independent voucher agency is likely to be costly to set up and run, thus increasing the administration costs as a proportion of voucher cost (an indicator which may be worth considering as part of monitoring and evaluation), they may also need to spend a lot of time raising their profile so that suppliers and recipients of the voucher good/service know what the agency does and can trust them. However, the advantages of an independent voucher agency are that they will be fully accountable, transparent and should add objectivity and diligence to the monitoring and evaluation activities (Gorter 2003). Moreover, once a voucher agency has been initially set up, it could be used to administer a range of different voucher schemes.

1.4.3 Community-led targeting

Community-led targeting has primarily featured as a method of identifying vulnerable households in the complex emergencies literature. Jaspars and Shoham (1999) have defined community-based targeting as "any beneficiary selection carried out by its own members". They explain that it has arisen "because of the need to target and the inability of outsiders to

do so on the basis of socio-economic criteria". Under this method of targeting, local representatives are commonly required to select households without livestock, with little available labour, or female-headed households who are not receiving support from relatives. Targeting programmes may rely on community leaders or elders, local government, or committees made up of representatives from the local community. They tend to be appointed by the community and their main responsibility is to identify vulnerable individuals and families to be targeted.

There are a number of advantages of community-led targeting approaches. First, there is the issue of the superior information available to communities about their members' circumstances. Compared to external agents, community members may know much more about each others resources, needs and circumstances without having to gather any data beyond what they see in the course of daily transactions. Secondly, because community members are linked by multiple and complex relationships, there may be greater consequences from hiding or misusing information, possibly leading to less leakage and therefore more accurate targeting. Thirdly, from the narrow perspective of the funders, the costs may be lower because community members are often not paid for their time or expertise, and expenses such as travel and communications costs are met by the community rather than the programme. This might make community-led targeting attractive in some circumstances, although it raises concerns about the fairness of imposing these costs on the community. Fourthly, targeting mechanisms that fail to build in community preferences risk being rejected or undermined by the population (both eligible and ineligible). Finally, communities may attach some value to the participation process *per se* (this issue was discussed in section 1.1).

Community targeting allows communities to define targeting criteria and delivery mechanisms that are potentially more appropriate and more accurate than those of external parties. At the same time, communities may face internal political or power divisions that influence the allocation of resources in ways that may undermine equity. Evaluating community-led targeting mechanisms may also be more difficult than evaluating externally-led ones for two reasons. The first is that the community's criteria may not be made explicit, which may make it more difficult to assess the resulting distribution of resources. The second is that the criteria may differ from those that would be adopted by an external agency. In this circumstance, it is important to recognise the potentially diverging goals of the community

and the external agency, and the way that these goals influence the distribution of the target good.

1.4.4 Delivery Channels

Whatever combination of targeting mechanisms (community, demand and/or supply led) is chosen, a delivery channel is needed to provide the goods/services. If there is very little infrastructure in a given setting it may be necessary to establish a delivery channel specifically for targeting the chosen subsidy. However, it is likely that there are at least some existing channels which can be utilised and if necessary, expanded or developed.

As well as being a targeting mechanism in its own right, the community will have structures that may be used as the delivery channel for other types of mechanism. For example religious groups, village welfare committees, respected community members such as village chiefs, religious leaders, teachers, community health workers etc. may all provide useful channels for reaching the target group. Existing government facilities such as health centres, hospitals, schools and government shops could also be utilised to distribute goods/services. Private infrastructure such as shops, markets and private clinics could also provide useful channels for reaching the target groups and such channels are commonly used in the social marketing of products such as condoms and other contraceptives. It is likely that there will need to be some kind of administrative back up and training support to delivery channels such as the provision of log books and the training and possibly payment of those who will be involved in the distribution.

1.5 Evaluation criteria for targeting mechanisms

The evaluation criteria for a particular targeting strategy must be related to the established goals/objectives of the strategy, and comparison of the effectiveness of alternative targeting mechanisms is likely to require an elaboration of evaluation criteria. Most commonly, targeting effectiveness has been evaluated in terms of the extent of coverage (or under-coverage) of the target group and “leakage” to the non-target group. Under-coverage has also been referred to as F-mistakes, or failure to reach the target population and leakage has been referred to as E-mistakes or errors of excessive coverage (Cornia and Stewart 1993)

The design of targeting approaches has focused to a greater extent on leakage than on under-coverage. However, some commentators have noted that the inclusion of non-target

households in schemes is not necessarily sign of failure. This will depend upon the proportion of non-target households included, the extent to which they are non-target, and the extent to which they benefit at the expense of target group (Zaman 1998). Narrowly-targeted interventions are often shown to be more efficient in the sense that they show favourable cost-benefit ratios (Mateus 1983). This is argued to arise from the smaller size of the target group, and the fact that the intervention is restricted to the most deprived or at risk, so that the expected benefit is greater than for a broadly targeted intervention. However, such a cost-benefit ratio is unlikely to capture the full costs of the intervention, since it fails to include the costs incurred by leaving groups out (Cornia and Stewart 1993).

There is clearly a trade-off between leakage and under-coverage. The objective of minimising leakage will raise under-coverage errors because some of the target population will be excluded from the intervention along with the non-target population. However, even where there is leakage of benefits to non-target groups, the intervention may fail to reach the target groups. In other words, a programme can simultaneously suffer from both leakage and under-coverage. It is therefore important to include an estimate of both of these errors in the evaluation of any targeting strategy. Identifying the reasons behind these errors and the extent and nature of the trade-off involved is also vital.

Under-coverage may result from failing to identify the target group, but also from low uptake. The reasons behind low uptake should be identified in an evaluation. Common reasons for low uptake may be insufficient information about the particular exemption scheme among the target group; social costs such as the stigma that may be attached to receiving a subsidised good or service; the prohibitive opportunity cost associated with accepting the benefit (e.g. income lost, time spent travelling to a public clinic or ration shop), or an inappropriate benefit e.g. one which is not useful or required by the target group. Evaluating under-coverage requires identifying those who are eligible but who do not benefit from a service, and will therefore almost certainly require population-based data collection (i.e. household surveys).

Leakage may result from inaccurate identification of the target group; however it may also be a consequence of incentive effects. The existence of a targeted subsidy may create incentives for people to provide false or distorted information or deliberately change their circumstances in order to obtain the benefit. Leakages may also be caused by deliberate corruption occurring on the supply side. The exploitation of the intended recipients may also be a

possibility if systems are not closely monitored, for example the target group may be charged for something which they are supposed to receive for free. Evaluation should seek to identify the sources of leakages and any other forms of corruption taking place within the system so that it can be avoided or minimised.

Leakage may occur outside of the household (i.e. the wrong households being selected for benefits); however, it may also occur within a household where for example an ITN intended for a young child is used by another member of the family. This kind of leakage or failure to stick to the target is difficult to quantify.

There is also the question of an appropriate time scale over which to measure leakage, since levels of leakage may alter over time (Matin 1998; Zaman 1998).

In addition to the challenge of determining who should be eligible for the targeted resource transfer, there is the cost of making these calculations and identifying eligible individuals. Developing accurate measures of poverty and health status, for example, often requires sophisticated and detailed data which is likely to increase costs. Different targeting mechanisms will invariably involve different administrative support systems, information requirements and will therefore incur different costs. As resources are limited, it is important to know not only the consequences of employing the different mechanisms but also the associated cost. Measuring and valuing these costs is therefore a critical component of any comprehensive evaluation. The costs may be borne by a number of different groups including the government, recipients and the wider community. The perspective of an evaluation and its ability to capture the distribution of costs will therefore be an important issue.

The quality of the good or service delivered to the target group also needs to be included in the evaluation of a targeting mechanism. For example, a body of literature is emerging on the problems of maintaining the quality of services targeted at the poor (Sen 1995; Devereux 2002). Sen (1995) has argued that “benefits meant exclusively for the poor often end up being poor benefits”. It is therefore important to monitor any changes in the quality of goods or services that result from the use of a targeting mechanism.

One argument for providing a targeted rather than a generalised subsidy is to minimise the negative impact of the subsidy on the private sector. This is of particular concern where the

resource being targeted can also be supplied through the private sector, and where there are concerns about establishing a sustainable commercial supply (e.g. of mosquito nets, agricultural inputs see for example (Tripp and al 2001)). There is relatively little discussion in the health-related literature of the impact of public provision on existing or developing private markets. In contrast, the literature on food aid (i.e. food-for-work programmes), identifies the potential for “damage” to be inflicted on the local economy and the type of coping strategies employed see for example Karim, Duffield et al. (1996); Jaspars and Shoham (1999). Evaluating the effect on the private sector is problematic since it requires identifying what would have occurred (in terms of private sector development) without the subsidy. The problem of establishing this “counterfactual” can be dealt with in part by including an appropriate control area that is not exposed to the intervention and comparing developments in this area with those in the targeted area. A pre- and post-intervention analysis will not be sufficient since it would be virtually impossible to detect a potential private sector entrant that was deterred by the subsidy.

Government or donor funds directed to a priority sector such as health or education may also be also fungible. In other words, they may simply replace rather than add to funds directed towards this sector from other sources. Therefore, it may be useful in evaluating targeting mechanisms, to attempt to understand the effects that the strategy has had on the public and private sector market for the goods or services in question and to identify if it has actually resulted in a net increase in resources devoted to the area of interest.

2. TARGETING ITNS

In this section we use the structure developed in section 1 to discuss the specific issues relating to the targeting of ITNS.

2.1 Evidence of ITN targeting strategies

A number of projects have attempted to target ITNs. The Population Services International (PSI) Social Marketing of ITNs (SMITN) project in Tanzania developed and distributed a number of products including a differentiated product aimed at pregnant women. The Lea Mwana (“to nurture”) product consisted of a large, differently coloured net bundled with a single sachet of insecticide, and sold at a 45% subsidy on product cost. It was distributed from maternal and child health clinics in 4 districts during the first phase of the project, and seems to have been quite successful in reaching target groups. For instance, follow-up visits to households which had received these nets revealed that the vast majority remained in the households. However, there is evidence that in two of the four implementation sites, sales of the other, less-subsidised PSI net fell dramatically following the introduction of the more-subsidised net (Hanson and Jones 2000). This demonstrates the potential for a subsidised product to erode or “crowd out” the market for full-priced alternatives, and the potential impact on sustainability.

In a second phase of the SMITN project the highly subsidised net targeted at pregnant women and children was discontinued and more effort was placed on the promotion and distribution of insecticide treatment and retreatment. Nets bundled with insecticide were sold with a universal subsidy, but marketing and education campaigns were used to promote the use of ITNs by vulnerable groups. Household surveys revealed that priority is given to children under five sleeping under a net over other household members, however it is not clear to what extent this is due to successful “targeted marketing” techniques (Hanson and Worrall 2002).

Also in Tanzania, the Kilombero Valley social marketing project (the KINET project) used vouchers in an attempt to minimise the effect of the subsidy on the market (Mushi, Schellenberg et al. 2003). These vouchers, which entitled the holder to a TSh.500 (approximately \$0.60) discount off the TSh.3000 (approximately US\$3.60) price of a pre-treated net, were distributed to pregnant women and mothers of under-5s through Maternal and Child Health (MCH) clinics, and could be redeemed at any of the KINET sales outlets. The advantage of such an approach for the creation of a sustainable distribution structure is

clear. However, the logistical requirements for scaling up such a system are considerable. For example, during the first six months of the operation, the project visited each individual shop to supply nets and to redeem the vouchers collected by the shop. In addition, although the redemption rate among those receiving a voucher was high, the share of the eligible population which took advantage of the voucher discount was low, indicating problems with awareness of the system. Finally, there was evidence that better-off women were more likely to benefit from the scheme than the poorest.

The use of a national scale voucher scheme to deliver subsidised nets and insecticide to pregnant women and young children is being developed in Tanzania following a successful application to the Global Fund for Aids, Tuberculosis and Malaria (GFATM). A UNICEF funded “dress rehearsal” of a voucher system is due to begin in July 2003 in two districts of Tanzania. However, at the time of writing, no further details were available.

A similar voucher system to those described above has been suggested for use in Uganda. This would aim to target pregnant women and under-fives with the voucher being distributed through health care outlets and redeemed in special kiosks or existing private outlets (Miller 2002; Saade, Hanson et al. 2002). More recently, this has been developed into a full plan which will be implemented if Uganda’s application to the GFATM for a national scale voucher scheme is successful (Vector control/ITN subcommittee of the ICCM 2003). This plan involves vouchers worth UGS 5000 (approximately \$2.90) being distributed to pregnant women and under fives through public health clinics and other civil society distributors such as Commercial Marketing Strategies (CMS) Uganda. The vouchers will be redeemable against the cost of an ITN at participating shops and retail outlets (current prices for ITNs in Uganda are estimated to range between UGS9,000-11,000, approximately US\$5.20-6.35) with the balance of the amount being paid by the women. The Ministry of Health will be responsible for the monitoring and evaluation of the system and for public awareness creation for the voucher scheme itself and generic health promotion of ITN use. It will also be responsible for identifying, mobilizing and training voucher distribution agents. The private sector is envisaged to play a key role in ensuring the availability of ITNs in areas where the vouchers are distributed and funds have been requested to support this through investment in distribution channels. Current estimates suggest that the voucher system will cost \$6.03 per net distributed, which breaks down into \$4.38 for subsidy, warehousing, management and administration, and \$1.65 per ITN distributed for sensitisation, awareness creation,

advertising and communication. The target group will have to meet the costs of obtaining and redeeming the voucher (travel and time costs) and the remaining balance of the price of the ITN which is not covered by the voucher (approximately US\$2.30-3.45).

Another common approach to ITN delivery is to sell subsidised or distribute free nets through health facilities, targeted to a greater or lesser extent. This approach has been widely used in many African countries including Angola, Comoros, Kenya, Madagascar, Malawi, Mozambique, Namibia, Niger, Tanzania, Uganda, Zambia and Zimbabwe (source: preliminary data from the ITN Project database currently under development by RBM/Malaria Consortium/Health Map). A particularly notable example is from Kenya where nets were distributed free to pregnant women through ANC (Ante Natal Clinics) (Guyatt, Gotink et al. 2002). Efforts were made to distribute nets and insecticide to 70000 pregnant women in 35 districts of Kenya through the existing network of ante-natal clinics. The distribution was carefully monitored and followed up at district, clinic and individual recipient level. The results of the evaluation revealed that over 50% of the nets and insecticide tabs had been distributed to pregnant women within 12 weeks and most of the others were at the district or clinic level by this time. Overall leakage of nets to non-target groups was estimated to be around 22%, although 80% of this leakage was authorised by the District level medical staff (e.g. for distribution to young children or for use on hospital in-patient beds), therefore of total nets procured it was estimated that only 4% went “astray”. Guyatt, Gotink et al (2002) also reported estimates of the financial costs for the ITN distribution. They estimated that the cost per ITN distributed was \$3.81, rising to \$5.26 per net delivered to a pregnant woman (includes leakage of nets to non-target group). The authors argue that the delivery system offers a cheap and equitable means to deliver nets, however it should be noted that the costs presented are financial and not economic (other studies report an economic cost which includes opportunity costs¹¹, for example ANC staff time) and will therefore be less than the true economic cost of the delivery system. Moreover, the costs reported do not include the costs imposed on the women of attending the ANC, which will include transport and opportunity cost of their time. The extent to which the delivery system is equitable will largely depend on the accessibility of ANC in Kenya. A study by Gwatkin and Guillot (2000) has shown that the equity ratio (calculated by dividing

¹¹ Opportunity cost is an economic term which refers specifically to the value of the most highly valued alternative forgone. For example in the case of ANC staff time it may refer to the benefits forgone because of the time spent distributing vouchers as opposed to treating additional patients

ANC attendance in the lowest income quintile by that in the highest income quintile) is 0.915, suggesting that ANC attendance (and therefore such a delivery system for ITNs) in Kenya is equitable. However, one fifth of women attending ANC did not receive an ITN, partly because of the limited number available, but also due to rationing of nets for other reasons, which may have equity implications. The authors also fail to document any evidence regarding the effects of this one-off delivery of free nets on the private sector in Kenya. Nevertheless, the results of this study add to the much needed evidence on ITN delivery strategies and its results should be compared with those of alternate delivery strategies in similar settings.

The existing evidence on ITN targeting activities is limited. Most efforts to target the distribution of ITNs have been pioneered in Tanzania and have focussed on the target groups of pregnant women and/or young children. There is no evidence in the literature of ITN targeting strategies aimed at the poor although many small scale local NGO's do carry out this role, see for example (Saade, Hanson et al. 2002). Many ITN distribution activities are almost universal or very broadly targeted (therefore beyond the scope of this review), especially in response to emergency or refugee situations. Evidence from carefully monitored alternative ITN delivery strategies is desperately needed in order to help define appropriate strategies.

2.2 Should we target ITNs?

There are a range of options for the delivery of ITNs which include both targeted and untargeted (universal) delivery and different levels of subsidy ranging from 0 to 100%. Table 1 presents a summary of these options and is used to structure the following discussion.

The main argument in favour of an untargeted 100% subsidy (free provision) on ITNs is that they are a public health commodity along the lines of vaccination and therefore a high degree of coverage is required in order to achieve effects over and above personal protection. In addition, it is suggested that any charges made towards the cost of an ITN will exclude the poorest population groups and will therefore be inequitable. Proponents of this view believe that in order to achieve a sufficiently high degree of coverage nets should be heavily or completely subsidised and used by a high proportion of the population. However, there is evidence that selling nets at commercial prices through a mix of private sector and social marketing activities can achieve high levels of coverage, even among the lowest socioeconomic groups. For example in Tanzania, following the SMITN2 project the number

of households owning at least one net was as high as 82% in urban areas and 66% in rural areas; treatment rates however were much lower (Hanson and Worrall 2002; Jamu, Hanson et al. 2002). Also in Tanzania, the KINET project achieved 67% coverage of the poorest households with an equity ratio (coverage in poorest households/coverage in least poor households) of 0.75 (Abdulla, Kikumbih et al. Undated).

The ongoing debate regarding free and/or universal distribution versus targeted subsidised distribution of ITNs ignores a number of other important factors. Firstly, it fails to consider the crowding out effects that providing universal free nets may have on the commercial sector. Secondly, free provision combined with a lack of viable commercial sector may be unsustainable because of the indefinite donor commitment required. Thirdly, inefficiency issues such as free provision to wealthier individuals and leakage from the target group are also neglected. Finally, there is no guarantee that the poorest of the poor will be reached by universal subsidies as barriers such as lack of information, access problems and a lack of infrastructure required to reach the poor in remote areas may not be in place. These issues strengthen the argument for a targeted subsidy (100% or less) on ITNs.

With respect to insecticide for treating nets, there is currently a debate over the extent to which untreated nets provide personal protection against malaria infection compared to ITNs. Guyatt and Snow (2002) have shown that untreated nets may be a cost-effective option and in some cases may actually be more cost-effective than treated nets. However, Curtis and Maxwell (2002) have argued that untreated nets can only be more cost-effective than treated nets when compared to the situation where people are made to pay for treatment which dramatically reduces treatment rates. They therefore argue in favour of free insecticide treatment for nets in Africa. The argument for free insecticide delivery is more robust than the argument for free net delivery, since the use of insecticide is generally very low and evidence suggests that it is extremely price sensitive with small changes in price leading to large reductions in re-treatment of nets (Müller, Cham et al. 1997; Snow, McCabe et al. 1999). Moreover, with the development of long lasting insecticide treatment technology, which would make retreatment a thing of the past, long term sustainability of free insecticide delivery is not as critical as for nets.

In view of the financing constraints facing the governments of poor countries, there is a growing interest in how the public and private sectors can work together to expand ITN use.

The idea behind this public-private partnership model is to encourage those with sufficient means to purchase nets from the commercial sector, while focusing or targeting public (donor and government) funds on those who cannot afford them at market prices (Roll Back Malaria 2002). Proponents of this demand led strategy, which is sometimes called “market segmentation”, argue that it should improve *equity* (by focusing subsidies on poorer groups), *efficiency* (by targeting subsidies on those who would not otherwise purchase a net), and *sustainability* (by encouraging the development of a viable commercial sector to provide a continuous supply of nets and insecticides). A number of African governments have adopted this strategy including Kenya, Tanzania and Uganda and considerable donor resources have been directed at encouraging the private sector to get involved in the sales of nets and insecticides for example, the NetMark partnership (www.netmarkafrica.org) and the Mennonite Economic Development Associates (MEDA) initiatives (www.meda.org).

It can be argued that ITN distribution should involve a targeted subsidy in order to promote sustainable private sector supply whilst still covering the most vulnerable groups who are unable to afford ITNs from the private sector. Targeting the subsidy may also help to keep the cost of the subsidy down as long as the cost of administering the subsidy is not too high. Even if administrative and subsidy costs are high, a successful targeting strategy with a long-term vision that supports the private sector and a carefully considered exit strategy should not need to be maintained indefinitely. However, the untargeted delivery of ITN subsidies may damage the private sector to the point where it collapses and the subsidy would therefore have to be maintained at high levels indefinitely. Sustainability can therefore be considered as one key objective of ITN targeting strategies.

Table 1 Options for level of subsidy and extent of targeting

	Universal (Untargeted)	Targeted
Free (100% Subsidy)	Free provision and re-treatment to all e.g. original bednet trials.	Free distribution of ITNs or nets and insecticide to certain groups e.g. pregnant women through ANC.
Subsidised (<100% subsidy)	Universally available subsidised product e.g. traditional social marketing or government approach to subsidy.	Subsidised product aimed at specific groups in the population either through marketing, delivery strategy, eligibility criteria, etc.
Public/Private model	Universally available through private sector at market prices, market may evolve into a segmented market. Combined with a targeted subsidy (0-100%) at poor, vulnerable or high risk groups.	
No public sector involvement	Available through private sector at market price.	Private sector market has evolved into segmented market with luxury products aimed at rich and basic or low quality products aimed at the poor.

2.3 Why target ITNs?

There has been little discussion about what the objectives of a targeting strategy for ITNs should be, other than to increase the coverage of ITNs among the poor and vulnerable. This implies that some equity and efficiency considerations underpin current targeting strategies for ITNs, however it is unclear what these specific goals are. Policymakers have been quick to adopt targeting approaches without carefully considering and making explicit their objectives, this has implications for the design and evaluation of ITN targeting strategies. The remainder of this section aims to conceptualise and describe the implications that the choice of target group may have on the trade-offs and outcomes of targeting strategies. Reference is also made to the possible objectives of targeting as laid out in our conceptual framework section 1 (equity, efficiency etc.).

The Oxford English Dictionary defines equity as “that which is fair and right”. The health economics literature tends to distinguish different dimensions of equity, for example, equity in health outcomes and in access to health services or interventions. Health outcomes are influenced by a variety of factors that may be less amenable to intervention through health policies (such as differing biological and genetic pre-determinants of health and other exogenous factors including nutrition and occupation), therefore, equity in health care would

seem to be the more appropriate dimension in the context of this debate. Equity in health care has been defined as “equal access for equal need” (Mooney 1994).

Taking “equal access for equal need” as the objective of an ITN targeting strategy requires carefully defining what is meant by “need” when selecting the target group. ‘Need’ may be defined in terms of the level of ‘health’ need or more broadly, in terms of ‘economic’ need. Health need can be expressed in terms of risk of malaria infection and its consequences therefore, those in the high-risk group are the target group who should be given priority access to ITNs. The individuals who fall in this high-risk group are generally agreed to include pregnant women and children under five who are more susceptible to malaria infection. If the concept of need is expanded to also include those who are at greatest risk of the most severe consequences of malaria infection (e.g. complicated malaria and mortality risk), this “need” group could be expanded to include those who may have less access to timely and appropriate treatment (Schellenberg, Victora et al. 2003).

This brings us onto a potentially more complicated definition of need, namely ‘economic need’. The extent to which pursuing an equity goal based on morbidity or mortality risk addresses the needs of the economically vulnerable will depend on the degree of correlation between health risk and socioeconomic status. There are many reasons why the correlation would be expected to be imperfect – i.e. that some of those at greatest health risk are non-poor; and some of the poor are not at the greatest risk. In this case targeting on the basis of ‘health needs’ may be deemed inequitable insofar as additional resources are being transferred to the relatively well off.

In terms of evaluation of ITN targeting strategies, it is important to be clear on the objectives of the policy before carrying out an evaluation. It is not sensible to design and implement a targeting strategy aimed at biologically vulnerable groups such as pregnant women and under fives and then to evaluate the success or failure of the strategy on the basis of its ability to reach the poor or economically vulnerable. While this may be an important consideration and may help to answer the question posed above regarding the extent to which there is overlap between the poor and the biologically vulnerable, the strategy should be evaluated against its original goals. Similarly, if a targeting strategy is required to reach the poorest members of society it should be designed and evaluated with this goal in mind.

There are a number of trade-offs to be considered within the broad target group of the poor and vulnerable. On one hand, targeting the poor may exclude many of the biologically vulnerable and may be less efficient since the biologically vulnerable may have a greater capacity to benefit from the intervention than the poor. On the other hand, targeting the biologically vulnerable may exclude many of the poor and may also be an inefficient use of subsidy since it will inevitably lead to those who could afford to purchase an ITN for themselves receiving the subsidy. This is an example of the well-known equity-efficiency trade-off, which has a tendency to occur whenever equity driven or redistributive policies are pursued. Ideally, to avoid either inefficiency it would be appropriate to target those who are both economically and biologically vulnerable, however the targeting tools available are likely to be too crude (have high leakage or under-coverage) or too costly to achieve such an aim.

The difficult trade-offs between the equity and efficiency of targeting based on biological or economic vulnerability require a more careful consideration in the design of targeting strategies for ITNs if the strategies are to successfully achieve their aims. Policy makers must therefore choose between targeting the poor or targeting the biologically vulnerable, with each of the associated costs and benefits. This is perhaps an issue in which the views and expectations of the communities involved should be carefully canvassed and considered. For example, some communities may find it unacceptable to target an intervention to young children rather than the breadwinner, since if the breadwinner is unable to support his/her family because they are sick the young child will suffer anyway.

2.4 What to subsidise?

In the case of ITNs, there is a choice between what to actually subsidise, the goods themselves, distribution systems or promotion to create demand for the good.

One option is to subsidise the good itself where the good may be an ITN, a net alone or insecticide alone. Nets and insecticides have very different characteristics and these may have implications for the choice of targeting strategy appropriate for each product. Nets are a relatively expensive product and may require a substantial proportion of household income for their purchase. However, they are also tangible and durable which makes them a potentially saleable or liquid asset. Insecticides on the other hand are invisible once they have been applied to the net and benefits may not be tangible for their whole duration (the visible

effects of killing nuisance mosquitoes and other insects will not last as long as the killing of malaria vector species). This means that insecticides are unlikely to be considered a saleable asset after they have been applied to nets, however insecticide treatment sachets are relatively cheap products. There is currently very little data on the own price elasticity of demand¹² for nets and insecticides but this would be extremely valuable in order to decide what products to subsidise and the level of subsidy to apply to achieve the required increase in demand. The development of long lasting or permanently treated nets may eliminate the need to consider all of these options in the future and choices between what to subsidise should be made with due consideration to the possibility of this product coming to market.

Theoretically, nets and insecticides are complementary goods, however, there have been no empirical studies examining the extent to which this is reflected in the market, i.e. the cross price elasticity of demand between nets and insecticides is not known. This information is important because in order to select what product to subsidise it is useful to have some idea what effect changes in the price (to consumers) of the good will have on the demand for other goods. For example if net and insecticides are strong complements, making nets cheaper will lead to an outward shift (increase) in demand for insecticides, and in this case it may not be necessary to subsidise both nets and insecticides. Little is known about the extent to which ITNs are complements or substitutes for products such as coils or sprays. This would give an indication whether the purchase of nets and insecticides would add to or replace household expenditure on coils and sprays. This might in turn have implications for the level of subsidy required (less would be needed if nets or insecticides replace existing expenditure on coils and sprays).

In some communities the level of untreated net ownership (among the chosen target group) may be sufficiently high to justify a subsidy on insecticides or insecticide treatment alone, whereas in other communities, with low net ownership, it may be necessary to subsidise both nets and insecticides to the target group. In many cases these activities will depend upon a (public or private) distribution system being devised or strengthened which will require further choices on how and where to target resources.

A second or additional option is to subsidise the promotional activities that are required to inform and educate the target group and the wider community on the availability and

¹² The responsiveness of the quantity demanded of a good to a change in its price.

appropriate use of ITNs. This requires further efforts to target the right message to the right group and could be considered as a targeted subsidy on demand promotion for the good. Appropriate targeting or modification of these less tangible, but no less important aspects of ITN delivery is particularly important for demand led targeting models in order to encourage more accurate self-selection.

2.5 Who are we trying to reach?

In the case of ITNs, targeting on both economic and biological grounds has been proposed. What is usually meant by economic vulnerability is those who cannot afford to purchase an ITN or other means of malaria prevention at prevailing prices. This usually means those who are poor, although even this notion may require some further elaboration in that poverty (or a lack of cash), can be highly seasonal in rural subsistence economies. Biological vulnerability to malaria morbidity and mortality is also complex to define and will depend on the level of malaria transmission. Generally in areas of high transmission some degree of immunity will be acquired by much of the population thus reducing morbidity and the risk of mortality. However, those with little, no or compromised immunity (young children and pregnant women) are at risk of severe morbidity and death. In epidemic prone areas, where the population has limited or no immunity, the whole population may be vulnerable to severe morbidity and mortality during outbreaks. Decisions regarding whom to target based on biological vulnerability will depend upon the local endemicity and must balance the risks of morbidity or mortality among different groups in the population. Since ITN targeting strategies are generally carried out in high transmission areas this discussion will refer only to the biologically vulnerable in such areas i.e. pregnant women and young children.

Although the link between ill health and poverty is recognised, the specific mechanics of this relationship for malaria are not well understood and the extent of overlap between economic and biological vulnerability to malaria is not clear (Worrall, Basu et al. 2002). While there is evidence that morbidity is unrelated to income level (Filmer 2002), the risk of mortality will almost certainly be greater for the poor who are less likely to have access (financial or geographic) to adequate and prompt treatment. In order to understand whether or not targeting biologically vulnerable groups will achieve sufficiently high coverage of the poor, the relationship between poverty and malaria must be better understood and there is an urgent need for research to identify who falls into the high risk group.

The evidence reviewed in section 2.1. indicates that priority currently lies with targeting vulnerable groups such as pregnant women and children. Attempts to target the poor specifically do not exist on a large scale. This may be due to the relative difficulty of identifying the poor and measuring socio-economic status, compared to the relative ease of identifying young children or pregnant women, and the fact that health services are traditionally more comfortable and experienced in reaching out to these groups compared to the poor. It remains a worrying possibility that the poorest groups will still be unable to obtain the benefits of ITNs, in spite of greater efforts to increase coverage using innovative targeting strategies.

2.6 How to Target ITNs: options for consideration

In this section we discuss options for ITN targeting strategies bringing together the theory and evidence from previous sections in order to identify the advantages and disadvantages of each alternative.

2.6.1 Demand led targeting of ITNs

In demand led targeting the benefit is generally available to all, but the target group self selects. In order for this strategy to work in the context of ITN delivery it will be necessary to segment the market to limit leakage to the non-target group to acceptable levels. There are a number of possible characteristics which can be used to segment the market such as price, quality, size, colour, process of acquisition and marketing. Each will be discussed in turn; however, it is likely that in a successful strategy a number of them need be used simultaneously.

With adequate price differentiation some degree of targeting may emerge, with the poor opting for lower priced products and those who can afford it opting for higher priced products. However, if all products are widely available, it would be difficult to control leakage of the lower priced good to the non-target group. Differentiation in terms of quality may be used in conjunction with price in an attempt to deter the less poor from purchasing heavily subsidised, lower quality products. However there are a number of potential problems with this strategy, not least the ethics of offering a lower quality albeit lower priced, product to the poor. In addition, it may be very difficult for someone who is unfamiliar with the product to make informed decisions regarding which product represents value for money and meets their individual needs (e.g. correct size, shape for particular sleeping conditions).

Creating a perception of quality differentiation is even more difficult when we consider retreatment with chemicals which cannot physically be seen.

Attempts have been made to vary the colour, size and shape of nets to promote consumption by a particular target group (e.g. the SMITN project in Tanzania and its Lea Mwana net for pregnant women, see above; quality differentiation in targeting has also been adopted in the PSI project in Malawi, Desmond Chavasse, pers. comm). There is some evidence of leakage from this strategy and it is difficult to see how relatively superficial characteristics can minimise leakage, however the evidence base for this is extremely limited and there is scope for further investigation of this technique. Subsidised nets may be given some possibly undesirable characteristic, such as printing with a government logo in order to minimise leakage.

Using the process of acquisition to target subsidised nets (e.g. through distributing them through ANC clinics, schools or community based projects aimed at the poor), may minimise leakage, particularly when the means by which they are distributed is known to serve a high proportion of the target group. For net treatment some NGOs have used communal net dipping to target poor communities with free or low cost retreatment. Since the process of acquisition may require each family to wash their nets with other people's nets or to retreat the nets on a specific day it may limit participation to those really in need. It is likely that such strategies will miss a certain proportion of the target group simply because of the access costs (time, inconvenience, travel) of obtaining the benefit. It may also lead to inequity if the poorest or most vulnerable groups are known not to access the place where the nets are to be obtained.

Marketing is likely to be insufficient alone to prevent the non-target group capturing the benefits of a targeted subsidy, however it is an essential tool in reinforcing other targeting strategies and informing the target population of their entitlements and how to access them. Care should be taken however, that the marketing medium is appropriate and accessible to the target group.

Demand led targeting does offer some possible options for targeting ITNs, however the degree of leakage from each may be unacceptably high. One important point to make is that a strong and competitive commercial sector should lead to the production of a variety of brands

of products with different attributes. This will allow consumers to choose the appropriate product for their budget and individual needs.

2.6.2 Supply led targeting of ITNs

Supply led targeting involves the criteria for inclusion or exclusion being administered by the supply or delivery side, this raises questions discussed in section 2.5 on who should be the target group. However, once these issues have been resolved, we are left with a further set of issues and questions to resolve. Options for identifying the target group include using directly observable characteristics such as age, geographic location, sex and pregnancy status, and indirectly observable characteristics such as socio-economic status and health needs. Using directly observable characteristics has the advantage that they are less easy to falsify and it may be possible to reach the biologically *and* economically vulnerable, by targeting pregnant women and young children in poor areas (geographical targeting). However, any form of geographical targeting risks creating incentives for people to move into the area to obtain the benefits, and the accuracy of the targeting is dependent on the homogeneity of individuals within the target area. This strategy may, however, offer an acceptable compromise between reaching the biologically and economically vulnerable. Another possibility is to use the community to target the goods within a defined area to a particular group defined either by them or in collaboration with other partners. This method may have the advantage of a higher proportion of the nets “sticking” to the target.

Recently interest in the use of vouchers to target a subsidy on ITNs is receiving more and more attention. Vouchers offer the potential to deliver a subsidy to a particular group of the population increasing demand and stimulating supply. A well managed and successful voucher system could meet the criteria of equity, efficiency and sustainability, however designing, implementing and managing such a system, particularly in countries with limited infrastructure, is likely to be a difficult process. There is still a need to carefully chose and decide how best to delivery vouchers to the target group. Moreover, this needs to be coordinated with availability on the supply side in order that the beneficiaries can exchange their vouchers for ITNs. A voucher which offers less than a 100% subsidy on the price of an ITN may still exclude the poorest groups, however, it may be possible to distribute vouchers worth different amounts to sub-groups within the target population. Voucher systems will also need close monitoring in order to establish, amongst other things, the different ways that the system can fail to offer protection to vulnerable groups and the extent of leakage to non-

target groups. Evaluation of a system should focus on equity implications of the approach, the impact on the private sector, and other advantages and disadvantages of the system. The administrative costs associated with the scheme and how these compare with alternative methods of targeting subsidies to vulnerable groups should also be a critical part of any evaluation. Finally, monitoring the impact of a voucher system on ITN coverage and on health outcomes is essential.

There are a variety of options available for the scaling up of ITN coverage in Africa. These range from a universal freely available “nets for all” approach to a purely private sector model. Within this spectrum lie a number of options for targeted delivery including various hybrids of demand, supply and community led approaches. Current opportunities to test a variety of different approaches offered by initiatives such as the GFATM should be seized. The impact, advantages, disadvantages, costs and benefits of each approach need to be carefully documented in order that a consensus can be reached on the most appropriate way to scale up insecticide treated net coverage in Africa.

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