INDICATOR TARGETING: THE JAMAICA FOOD STAMP PROGRAMME

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1. INTRODUCTION

This paper analyses the experience of the Food Stamp Programme (FSP) and suggests a number of indicators that would bring an improvement in targeting and reduce targeting errors. The relationship between the targeting errors and the share of programme budget allocated to administrative costs is also derived, coupled with estimates of the optimal budget share of administrative cost. The estimated optimum may be used in conjunction with the errors of targeting as performance indicators to be monitored.

Targeting has received special significance in the early 1980s in response to economic transformation and the need to provide safety net and social insurance for the poor and vulnerable in Jamaica. Indicators known to be strongly correlated with objective and subjective poverty are analysed in terms of targeting poor households (HHs), and the results juxtaposed against those used by the FSP to target the poor. The results suggest that indicators, other than those used by the FSP and related to housing conditions, and ownership of durable consumer goods, may perform better in targeting the poor. The extent to which these indicators perform is reflected in the type I and type II errors. I suggest that the derivation of optimal poverty-reducing effects requires the minimisation of both type I (E_1) and type II (E_2) errors and the share of programme budget directed towards administrative cost. This is consistent with the importance Atkinson (1995) attaches to targeting. However, there is no standard against which to judge the share of programme budget allocated to administrative cost. Moreover, the literature suggests that while high administrative cost reduces the amount of resources allocated to the poverty intervention, reducing it may also lead to inefficiencies and increased errors. Similarly, in some cases, spending more on administration may lead to an improvement in targeting.

The paper begins by establishing the relationship between the fineness of targeting and the share of administrative cost. The E_1 and E_2 errors are then defined. Next the relationship between these errors and the share of administrative cost is considered, computing the optimum share of administrative cost in a programme's budget. An overview and the targeting performance of the FSP and other means of identifying the poor are assessed, followed by an analysis of the programme's administration and cost and the conclusion.

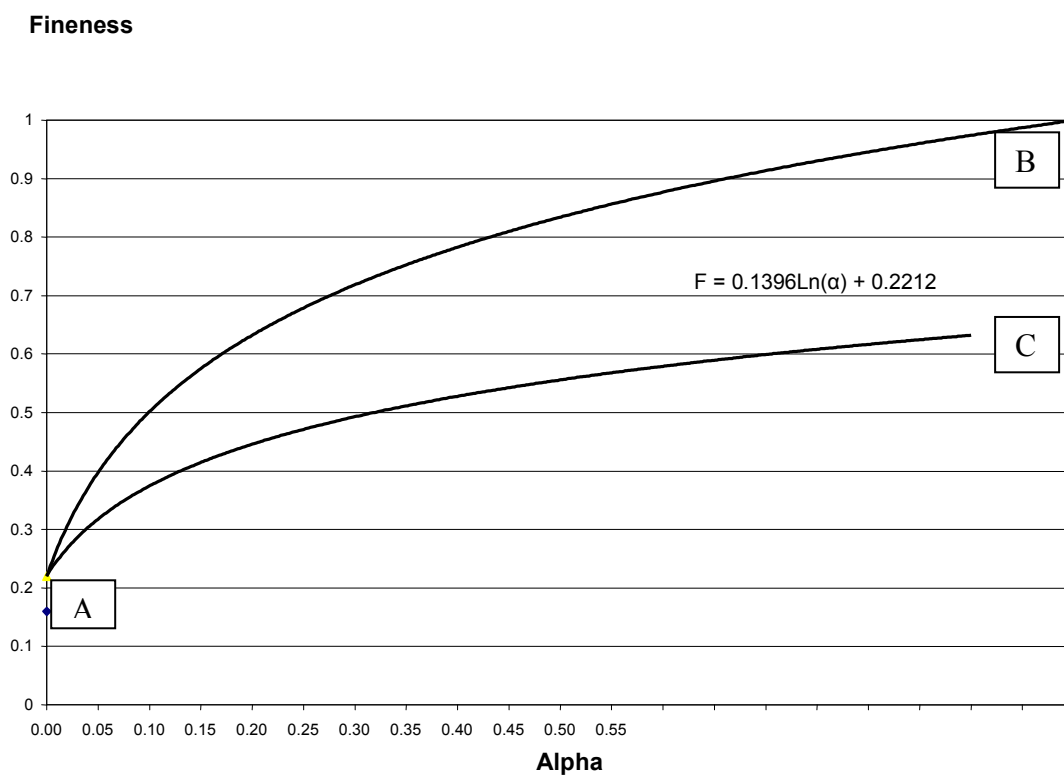## 2. ADMINISTRATIVE COST AND THE FINENESS OF TARGETING

This section looks at the relationship between the fineness of targeting and the share of the programme budget allocated to administrative costs, both generally and specifically to the FSP. The adequacy of the current FSP budget and the amount of resources needed to bring the poor up to the poverty line are also analysed. This is followed by an outline of the errors of targeting. I begin by looking at the fineness of targeting. The fineness of targeting (F) is expressed as a function of administrative cost (White, 2001):

$$F = \frac{N_P^T}{N^T} = F(\alpha) \tag{1}$$

where N_P^T is the number of poor HHs registered on the programme, N^T the total programme beneficiaries, and α is the share of administrative cost in the total programme budget. The first

and second differential of the function $(F' > 0 \,\&\, F'' < 0)$ suggest that the cost of improved targeting increases at an increasing rate. This is illustrated by examining the performance of the food stamps programme in reaching the poor in 1993 and 1997, when the share of administrative cost was at its lowest and highest respectively. The function depicted by the line AC is derived from joining the two points where the fineness of targeting is assumed to be non-linear and is in accordance with the hypothesized relationship suggested by Besley and Kanbur (1993:71) and the quadratic form AB, suggested by White (2001).[1] The data suggest that 41.3 percent of the targeted poor received food stamps in 1993 and their proportion increased by a mere five percentage points to 46.0 percent in 1997 (39.5 percent of the poor received food stamps in 1999), although

Figure 1: The F(α) Function

Fineness

$$F = 0.1396\,Ln(\alpha) + 0.2212$$

Alpha

the share of administrative cost increased by approximately five times. Improvement in targeting is also evident in the share of programme beneficiaries in the lowest two consumption quintiles. For 1993, 66.1 percent of programme beneficiaries were in quintiles one and two, however, this increased to 75.3 percent in 1997. The proportion of beneficiaries in the first two quintiles in

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[1] The point where the functions touch the horizontal axis is derived based on the assumption that in the absence of perfect targeting and where a universal scheme is in operation the proportion of the beneficiaries receiving the benefit who are poor is equal to the proportion of poor individuals/households within the population. This is based on the assumption that each individual/household has an equal chance of accessing the program and thus point A is the same as the headcount in 1993. At this point targeting cost is zero. The AC curve shows the relationship between administrative (targeting) cost and the proportion of programme beneficiaries in the FSP who are poor, while AB is the hypothetical relationship.

1997 remained unchanged in 1999, in spite of the fact that the share of administrative cost returned to the 1993 level of approximately 5.7 percent, pointing to the lagged effect of the 1997 level of administrative cost.

It is reasonable to expect that F will tend towards one (all poor HHs targeted) as α tends towards one (entire programme budget spent on administrative cost) in a situation of perfect targeting, but this also means that while all the poor are identified, no monies are left to be spent on the poverty intervention; an unlikely scenario. However, in the case of the food stamp programme, the projected trend (AC) is somewhat different from the hypothetical solution (AB) but is generally consistent with expectation (See Figure 1). The result, possibly, reflects the fact that a significant part of the programme is not means tested and the programme's quota restricts the number targeted to less than the number of poor individuals, coupled with the fact that the benefit is very low. The results may also indicate that the current budget is inadequate even if spent entirely on identifying the poor, previously indicated as an unlikely scenario. The inadequacy of the programme's budget may be judged by establishing the amount of resources needed on average to bring the poor up to the poverty line. The resources needed to eliminate poverty may be expressed as:

$$C_{pt} = \sum_{i=1}^{N_p}(z - y_i) = N_p\left(z - \overline{y}_p\right) \qquad (2)$$

where C_{pt} is the total resources needed for perfect targeting, N_p the number of individuals estimated to be poor, z the poverty line, and y_i the per-adult equivalent income or expenditure of poor HHs. For the objective poor, the average transfer needed to bring HHs up to the poverty line was JA\$12705, JA\$9342 and JA\$4628 per annum for 1999, 1997 and 1993 respectively while for the subjective poor JA\$16307, JA\$13734.7 and JA\$6526 respectively were needed. When the shortfall in resources is multiplied by the estimated number of poor HHs, (estimated average total HHs for 1999, 1997 and 1993 are 860 567, 635 100 and 608 700 respectively), the total annual transfers needed by the objective poor are JA\$1.8, JA\$1.0 and JA\$0.45 billion. The respective amounts required by the subjective poor are JA\$3.4, JA\$2.4 and JA\$1.2 billion. The shortfall of resources needed by the poor, coupled with estimates of the optimal share of administrative cost, may be used as an indication of the level of financing required by the programme.

The poverty gaps reported above must be viewed within the context that JA\$289.8 million in benefits were disbursed by the food stamps programme in the fiscal year 1999/00, less than a fifth of what is still required, on average, to bring the poor up to the poverty line. For the period 1993 to 1999, the weighted average benefit received by beneficiaries as a proportion of the poverty line declined from 5.4 percent to 2.9 percent (and from 9.1 percent to 5.5 percent of the food poverty line) (See Annex 2). As a consequence of the insufficient budget, fewer HHs may be targeted or alternatively all of the poor may be targeted but with a lower level of benefit. The latter approach seems to have been pursued by the FSP.

This suggests that the actual coverage of the programme is a function of the programme's budget, which is less than the amount ideally required – it is not clear whether the FSP intended to bring all HHs up to the poverty line. In fact, the benefits transferred may be expressed in terms of the coverage of the programme $\left[N^T/N = (1-\alpha)V(T)\right]$, (where $V(T)$ is the value of the transfer,

N^T the number of poor receiving the benefit and N the total number of poor HHs) which shows that there is less money to be disbursed as benefits as more is spent on administration and *vice versa*.

Generally, social programmes aim to raise the welfare of as many of the poor by as much as possible, within budgetary constraints. The extent to which this is achieved depends on successfully minimising targeting errors. This means both E_1 and E_2 errors are important and a "firm preference for one over the other is rarely stated" (Grosh and Baker, 1995:9). Cornia and Stewart (1995) suggest that the E_1 errors may be computed in two ways: The first computes the number of the target population not receiving the benefit as a proportion of the total population. The second, and used in this work, computes the results as a proportion of the target population. This may be expressed as follows:

$$E_1 = \frac{N_p - N_P^T}{N_p} = 1 - \frac{N_P^T}{N_P} = 1 - \frac{N_P^T}{N^T} \frac{N^T}{N} \frac{N}{N_P} \tag{3}$$

where N_P is the total number of poor HHs.

Similarly, the E_2 error can be computed using two approaches and both are used in this work. First, the number of non-target population receiving the benefit may be computed as a proportion of the total number of HHs targeted or receiving the benefit and is shown algebraically as:

$$E_2 = \frac{N_N^T}{N^T} = 1 - \frac{N_P^T}{N_T} = 1 - F(\alpha) \tag{4}$$

where N_N^T is the total number of non-poor HHs receiving the benefit.

Secondly, the number of the non-target population receiving the benefit may be computed as a proportion of the total non-target population (N_N). The latter approach is useful since it allows for inter-temporal comparison and is given as:

$$E_2' = \frac{N_N^T}{N_N} \tag{5}$$

The performance of the FSP and a set of indicators in terms of their targeting errors will be analysed at a later stage in this paper. In the following section the relationship between the targeting errors and administrative cost is analysed.

2.1. Targeting Errors And Optimal Administrative Cost

The literature points to varying levels of the share of administrative cost, with higher levels for means-tested programmes (Cornia and Stewart 1995:367, Grosh 1995:459-461 and Devereux 2002), but remain somewhat silent as to whether these shares constitute an optimum level, even though their influence on the poverty reducing effect is appreciated. The literature also recognises the need for a reasonable level of investment in procedures and administration, but one may ask: What is reasonable? In this light, knowledge of the optimal level of the share of administrative cost may act as a guide for programme administrators and donors to use as a performance indicator. In this section, the relationship between the E_1 and E_2 errors and the share of administrative cost are analysed and, given the relative weights applied to the targeting errors, the optimal share of administrative cost is derived.

Based on equation (3) the E_1 error may be rewritten as (White, 2001):

$$E_1 = 1 - (1 - \alpha)\frac{F(\alpha)V(t)}{P_o} \tag{6}$$

Differentiating the function with respect to alpha gives:

$$\frac{\partial E_1}{\partial \alpha} = \frac{V}{P_o}[F - (1 - \alpha)F'] = \frac{\phi V}{P_o} \tag{7}$$

where $\phi = (F - (1 - \alpha)F')$ captures the impact of rising administrative cost on the E_1 error. The E_1 error increases as there is less money for the intervention but decreases as targeting improves. It will be shown that the value of ϕ is crucial to the derivation of the optimal level of α. Phi is shown to be negative for low values of α, and positive for higher ones (See Annex 3). And $F = 0.2212 + 0.1396\ln(\alpha)$, is derived from the function shown in Figure 1.

On the other hand, with respect to E_2 errors, differentiating equation 4 with respect to alpha gives: $dE_2/d\alpha = -F' < 0$. However, the headcount is shown to influence the parameter value of F, which implies that $dE_2/dP_o < 0$. This suggests that the E_2 error is inversely related to the alpha-ratio and the poverty headcount.

Next, I generate the optimal share of administrative cost given the targeting errors and the weights assigned to them. Suppose the following utility function where γ is the weight assigned to E_1 errors:

$$U = \gamma_1(1 - E_1) + (1 - \gamma_1)(1 - E_2) \tag{8}$$

substituting equations (4) and (6) into (8) gives:

$$U = (1 - \alpha)\gamma_1\frac{F(\alpha)V(T)}{P_o} + (1 - \gamma_1)F(\alpha) \tag{9}$$

differentiating equation (9) with respect to α gives:

$$\frac{\partial U}{\partial \alpha} = -\frac{\gamma_1 V}{P_o}\phi + (1-\gamma_1)F' = 0 \tag{10}$$

Solving equation 10 for α gives the optimal share of administrative cost given the E_1 and E_2 errors. The value of Phi varies between negative 0.78 and 0.22. Substituting the values for V and P_o for 1999, 1997 and 1993 into equation 10, the optimum share of administrative cost occurs at phi equal to negative 0.12 percent (for both objective and subjective thresholds). In addition, assigning the weights for E_1 errors, which vary between zero and one, the optimum share of administrative costs vary in the same order, from zero to eleven percent (See Annex 4). However if equal weights are applied to both targeting errors, the optimal share of administrative cost is 6 percent. The results are also consistent when the value of the benefit transferred by the FSP is used, but the actual average share of administrative cost for the FSP is the same as the upper limit of the optimal share, suggesting that the targeting outcomes of the programme can be improved by using the set of indicators proposed below.

The experience of the FSP suggests that consideration should also be given to the actual level of administrative cost. The literature also points to the fact that low administrative budgets may result in deficient programme management, while spending more on administration within a given programme framework may lead to better service quality and incidence or both (Grosh, 1994:46). This view is supported by Devereux (2002:22), using the example of the GAPVU programme in Mozambique, where cost effectiveness taken too far became counter-productive. Clearly, to ensure that those genuinely in-need are the ones receiving the benefit, periodic registration and re-certification of need is necessary, with implications for administrative costs, as will be shown in the case of the FSP.[2] In this light, the optimal share of administrative costs established above may be instructive as a guide to aid programme administrators. This suggests that while an optimal share of administrative cost is specified, the actual implementation of the programme and targeting indicators used may also influence the targeting outcomes and the desired poverty reducing effect. At a later stage, the performance of the Food Stamp Programme, both in terms of the distribution of food stamps by consumption quintiles, and E_1 and E_2 errors are analysed, but first, an overview of the FSP is provided.

3. THE JAMAICA FOOD STAMP PROGRAMME
3.1. Overview Of The Food Stamp Programme
The data for this section come from the Jamaica Survey of Living Condition (JSLC) data sets, interviews held with key officials of the Ministry of Labour and Social Security (MLSS), Ministry of Local Government, the Planning Institute of Jamaica (PIOJ), beneficiaries of the now defunct Food Stamp Programme (FSP), and beneficiaries and applicants of the Programme of Advancement Through Health and Education (PATH) which replaced the FSP. Official documentations of the programmes, data from the Ministry of Finance on the administration of the FSP, and payment of benefits are also analysed. This section outlines the elements of the FSP and the targeting mechanisms used, allowing insights to be gained into its operations and to learn

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[2] Fine targeting comes at a cost to the poor; administrative costs may escalate resulting in reduced resources for the intervention, political support may evaporate and behavioural response may create additional costs.

from its experience in targeting poor and vulnerable HHs, so reducing the likelihood of repeating similar mistakes in other attempts at targeting the poor, such as the PATH programme. The section also sets the background to the relationship between administrative cost and the different targeting approaches.

The Food Stamp Programme (FSP) was implemented in 1984 in response to the social and economic hardship experienced by HHs (Ezemenari and Subbarao, 1999). It was part of a wider Food Aid Programme (Boyd, 1988:148) targeted at school children (school lunch programme, which is not included in the analysis), pregnant and lactating women, infants, elderly and the destitute. Two primary objectives were pursued: improving the nutritional status of 'children less than six years old' and 'pregnant/lactating women', and reducing the level of poverty. Both initiatives involved supplementing the income of HHs who are generally perceived by the MLSS as poor. While poverty alleviation was the overriding concern, poor HHs were not defined in terms of the official poverty line, nor was there a stated intent to reduce the level of poverty by a given amount. In discussions with the Director of the Public Assistance Division I asked: "From your experience are there other indicators that you consider useful in identifying the FSP target group? The response was that, "HHs should be poor regardless of the other criteria used by the FSP" (interview held at the MLSS, 21st June, 2002). In other words, it was expected that the target groups from which participants were drawn consisted primarily of the poor. Despite the fact that the indicators were not tested in terms of their correlation with poverty, they were used as a way of identifying the intended target group – the poor – possibly due to the unavailability of data on poverty at the inception of the FSP.

Three approaches to targeting are distinguishable in the FSP: indicator targeting, self-selection and means-testing. In the first approach (indicator targeting), the target group includes people who are considered at risk such as: 'children aged six years and less'[3], 'malnourished children' even if above the age of six, the 'elderly/poor/disabled' and 'pregnant/lactating women'. All four groups could access the programme subject only to their ability to register successfully, which is a function of whether the quota for the particular category was filled. In general, the quotas for the first and last categories tended to be under-subscribed, which reflects the fact that eligible participants may choose not to participate and initiatives to recruit new beneficiaries were not on-going. Limiting the target group to mothers and children who attend public health centres may have also influenced the result, but this requirement was not strictly adhered to and Anderson (1993) points to the significant number of women who applied for the benefit but never received a response to their application.[4] The use of this category was, however, justified based on Anderson's (1989:27) argument that "studies of the nutritional status of pregnant women have consistently shown nutritional deficiencies, particularly with regard to haemoglobin levels".

While no account was taken of the level of consumption of individuals recruited for the

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[3] This age group is generally considered vulnerable to undernutrition and the functional consequences of poor health are thought to be more severe for these age groups, hence the use of this indicator. The case for age-based targeting is made even stronger if the actual allocation of food and non-food nutritional inputs are skewed away from young children. This cannot be determined in this study but Haddad and Kanbur (1991b) suggest that the literature points to intrahousehold distributions that are biased in favour of males and adults especially in South Asia.

[4] Grosh (1994:11) points to a positive incentive effect of the food stamp programme and its link to maternal-child health in encouraging the use of preventative health care services. The author argues that children and pregnant/lactating women have an incentive to avail themselves of more preventative health care.

nutritional component of the programme, it was expected that since these individuals were required to attend public health clinics, the process of self selection – the second distinguishable approach – would reduce the likelihood of non-poor households being targeted. The decision to use health centres as a basis for inclusion into the food stamp programme was not only a screening mechanism but also eliminated the administrative burden of a means test. In fact, attempts to have 'pregnant/lactating women' and children registered and paid at health clinics by health officials never took off and MLSS officials, rather, carried out most of the registration and payment tasks. This process was not different from the regular registration and payment at food stamp distribution sites, with only the burden of standing in lines for a substantial amount of time remaining as a self-targeting mechanism. The number of beneficiaries recruited through this means was invariably inadequate and special initiatives to register mothers and children at health centres were therefore mounted periodically.

The promotion of preventative health care and the elimination of the need for means testing are positive outcomes of the use of health centres but the need for adequate systems to identify and register malnourished children was overlooked. This was supported in discussions with community health workers and analysis of targeting outcomes by Anderson (1993), Grosh, (1995:462) and Cornia and Stewart (1995:355), pointing to the fact that the programme was less successful in reaching malnourished children than healthy children. This is, possibly, due to their lower clinic attendance, but even in cases where they did attend clinics, they had lower food stamp coverage (Anderson, 1993:50). Yet, a system existed for the referral of malnourished children to the food stamp programme. Anderson (1993:50) sums up the situation, arguing that "while the registration of malnourished children should have been regarded as a high priority goal, the programme failed to incorporate them at any level commensurate with their need, or to put in place mechanisms that ensured priority treatment to this group". This may also be influenced by the fact that the Ministry of Health has its own remedial programme targeted at malnourished children. But it is also possible that nurses' interests may have worked to exclude some potential beneficiaries from the programme due to the extra costs they had to incur in order to refer beneficiaries to the MLSS.

As indicated, initial collaborations, between the Ministry of Health and the MLSS to register and pay 'pregnant/lactating women' and children, were not successful and officials from the MLSS, therefore, engaged in periodic initiatives to register potential beneficiaries at public clinics. The short time during which 'pregnant/lactating women' may qualify for the benefit and their resulting high level of turnover coupled with low levels of enrolment led to initiatives, in 1994, to register and pay the benefit if these individuals presented themselves at payment points with proof of pregnancy. This was a temporary measure to reduce the cost of targeting and increase the numbers of beneficiaries, but was also subject to possible abuses. As a result, the main strategy used to attract women and children to the programme was through visits by officials to public clinics[5], and advertisements. Advertisement for all benefits took the form of posters at civic sites but word of mouth seems to have been the most popular means through which individuals learned of the programme, payment dates and initiatives to recruit potential beneficiaries.[6] Community health aides were also instrumental in this process by providing

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[5] In keeping with Grosh (1994), some of those who used public health care for their basic health needs choose not to participate, possibly due to stigma.
[6] While word of mouth can be an important source of information about the programme, significant distortions in

information to potential beneficiaries.

On the other hand, the means-tested component of the programme – the third targeting mechanism – was generally over-subscribed. Although the means test is based on HHs' wealth and income, this is difficult to establish since individuals have an incentive to lie. In evaluating income, account must be taken of the multiple sources from which income is derived, but more daunting may be the task of verifying respondents' claims. The approach used in the food stamp programme made no attempt to value in-kind, informal sector or home-produced income, nor was income verified. Generally, HHs were asked to reveal their income and this was recorded (Grosh, 1994). However, home visits by social workers allow for an assessment of whether living conditions are at odds with reported income.

The means-tested component of the programme targeted 'poor and indigent HHs' of which the 'elderly/poor/disabled' category was considered a part. Since these individuals were referred from other programmes and were targeted based on their individual characteristics, they were not subjected to a minimum income threshold or required to show proof of need.[7] Elderly individuals who were not in receipt of a pension and received public assistance, automatically qualified for food stamps. Similarly, individuals, in receipt of poor relief benefits,[8] and the disabled, were also referred to the FSP. On the other hand, potential beneficiaries through the means tested part of the programme were, generally, registered based on their own initiative after their well-being status had been verified. While this did not prevent the participation of non-poor households, there is some doubt as to whether the programme initially intended to target all poor households, as Boyd (1988) seems to suggest. Given the small quotas set aside for poor HHs, initiatives were also pursued to remove individuals from the food stamp programme by training a member of their household. This shift in emphasis from welfare to workfare allowed able-bodied members of food stamp recipient HHs to become gainfully employed and permit other poorer qualified HHs to access the food stamp support. The verification of need, suspension of the programme and re-registration of beneficiaries were also methods used to ensure that non-poor households were removed from the programme. This section outlined the targeting mechanisms used by the Food Stamp Programme. In the next section, an analysis of the performance of the programme in targeting the poor is put forward.

4. ANALYSIS OF TARGETING PERFORMANCE
4.1. Assessment Of The Food Stamp Programme's Targeting Performance

In analysing the targeting outcomes of the FSP, attention is paid to the distribution of benefits across the income distribution and the E_1 and E_2 errors.[9] [10] This is done for the programme as a

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information can occur and it should not be relied on to provide important details about the programme.

[7] Single-person HHs who earn less than $7,000 and families with two or more members and income below $18,000 annually in 1993, are the target groups and in recent times, a kerosene stamp was introduced in response to the removal of the subsidy on this good. The income thresholds for single persons and families are 47.3 percent and 30.1 percent of the per-adult equivalent poverty line and the poverty line for the reference family respectively.

[8] The poor relief programme caters for many of the basic needs (housing, schooling of children and health care) of HHs who are classified as destitute. For instance, food stamps and poor relief beneficiaries are not required to pay to register at public hospitals or health centres and certain medications are free. In addition, beneficiaries from both programmes have access to the school fees cost sharing programme.

[9] The limitation to this approach and suggested by van de Walle (1996:589) is that it may not be possible to capture

whole and by category of beneficiaries. The performance of the FSP indicators, in terms of their E_1 and E_2 errors, is later compared with indicators used in proxy-means test. The intention is to select the indicators with the minimum set of targeting errors, consistent with the need for an optimum share of administrative cost in the programme budget.

All the HHs estimated as objectively poor in 1999 are found in the poorest quintile and approximately half of the individuals receiving food stamp benefits were from this quintile, but the level of total participation of poor HHs – 17.3 percent, seen in Table 1 – is exactly equal to the head count index. The data also show that the proportion of HHs in each quintile receiving food stamps declined with increasing welfare status. The proportion ranged from 41.1 per cent to 2.1 per cent for quintiles one and five respectively.[11] Given the fact that stamps were distributed to 17.3 per cent of HHs, and the poverty line falls within the first quintile, there may be some scope for improved targeting. This result slightly contrasts with that for the subjectively poor, where 10.6 percent of individuals received the benefit, though 74.0 percent of those receiving the benefit are subjectively poor. This supports the argument that these individuals will seek to register and participate in the food stamp programme.

Table 1: Receipt of Food Stamps by Quintile, 1999.

	Households		Categories (individuals)					
Quintiles	Pooled sample (HHs)		Children Less than Six years	Pregnant/ Lactating women	Elderly/ Poor/ Disabled	Single member household	Family plan	Kerosene
	Share	Distribution	N =177	N =9	N =226	N =5	N =15	N =30
1	41.1	47.3	44.1	66.7	54.0	40.0	26.7	46.7
2	24.3	28.1	29.4	11.1	24.8	20.0	33.3	43.3
3	13.2	15.2	14.7	22.2	15.5	0	26.7	6.7
4	6.1	7.0	8.5	0	5.3	40.0	13.3	0
5	2.1	2.4	3.4	0	0.4	0	0	3.3
Jamaica	17.3	-	-	-	-	-	-	-

Source: JSLC 1999 Data.
Notes: (1) to target HHs based on their use of kerosene is subject to incentive effects and problems of verification; (2) the sample size of some of the categories is too small to say anything which will be statistically significant.

Nonetheless, consistent with findings by Grosh (1994), the distribution of benefits is generally progressive since it gives a higher proportion of benefits to the poor than the proportion of the population that they represent. This was generally true for all categories of beneficiaries (the number of 'pregnant/lactating women', 'single member HHs' and 'family plan' beneficiaries are too small to allow for meaningful analysis). However, the proportion of elderly/poor/disabled individuals in the poorest quintile was above the average proportion. The indicator,

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the true distribution of living standards in the absence of government spending. Yet, it is ideally the without-FSP income that is needed to assess targeting performance. This cannot be done by simply subtracting FSP from total expenditure because FSP may be substituting for other income, either in the standard disincentive effect manner or the time cost required to collect it and may reduce other income earning possibilities.

[10] In analysing the targeting errors we focus on the 1999 data because the indicators that are important correlates of well-being are generally stable over the period and housing conditions and ownership of consumer durables are expected to perform best in terms of targeting errors. The 1999 data were also selected because they are the most current.

[11] It is important to note at this point that the programme did not set out to target all of the poor as seemed to be its initial objective suggested by Boyd (1988).

'elderly/poor/disabled', seemed to perform better in identifying the poor than the variable, 'children less than six years old'. The category 'children aged less than six years', accounts for a higher proportion of beneficiaries in the highest two quintiles. Administrative problems in registering of 'pregnant/lactating women' and children occurred from time to time and may be reflected in the results (See Grosh 1995:462). The difference in the results for the two categories may also reflect the fact that while 'elderly/poor/disabled' individuals are recruited from programmes targeted at the very poor, any child within the specified age group attending a public clinics may participate. The results reported above must be viewed against the background that 72 percent of programme beneficiaries were from the categories 'children less than six years' and 'elderly/poor/disabled', the latter group accounting for just over half the combined percentage in 1999 (See Annex 2, for the shares of other categories).

The results suggest that despite the income thresholds reported above for the means-tested component, which are ridiculously low, and the time cost of registering children at health centres, non-poor HHs accessed the programme. This is possibly due to the strategy of periodically monitoring of HHs' well-being (only the means tested component), and the belief that members of the ruling political party may have access to the programme regardless of need. This is possible since potential beneficiaries may be recommended by community leaders, Members of Parliament and Parish Councils. This result, though different, is consistent with Rao and Ibanez (2004:30) findings that networks and access to local leaders allowed some community members in Jamaica to obtain social fund projects that were of highest priority to them, and these individuals are not the poorest, making targeting outcomes less than desirable. Clearly, the targeting dilemma is applicable here. With increased monitoring and accuracy in targeting, Besley and Kanbur (1993) suggest that administrative cost will rise at an increasing rate, reducing the resources available to be transferred to the needy, with associated efficiency and equity losses (Devereux, 2002). I return to this issue at a later stage in the paper. Equally important however, are political cost considerations, which may be evident in the role played by Members of Parliament.

A somewhat different picture emerges on analysing the distribution of benefits by category of beneficiaries and poverty status. Of poor individuals, 89.7 percent of beneficiaries were 'elderly/poor/disabled' and children, but most of the beneficiaries were from the elderly category (57.1 percent). These results are consistent with the fact that 87.2 percent of all beneficiaries were 'elderly/poor/disabled' and 'children less than six years'. However, 85.6 percent of non-poor beneficiaries were also from the categories 'elderly/poor/disabled' and children. These indicators are more difficult to conceal, or change, than income but the indicators are useful only to the extent that they are highly correlated with being poor. In both cases, the correlation coefficients between poverty and the variables 'elderly/poor/disabled' and 'children aged less then six years' are weak at 0.13 and minus 0.10 respectively, supporting the literature that this approach is highly susceptible to both types of targeting errors. [12] The E_1 and E_2 errors for both indicators are

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[12] Similarly, a low correlation coefficient (0.26) is obtained for the relationship between objective poverty and the general receipt of food stamps. However, should the sample be restricted to the lower half of the distribution, the general correlation coefficient declines by just under twenty five percent, but the relationship between being poor and the variables 'elderly/poor/disabled and children less than six years' improves, with the coefficient for the latter variable now becoming positive. Part of the explanation for the results may be related to the fact that the combined benefits received by some HHs may have pushed them above the objective poverty line.

relatively high (See Table 2) and may be due to less than perfect (low) correlations, the programme budget, or errors in identifying the categories. The E_1 errors in Table 2, for the objective and subjective poor, are generally the same but differ somewhat if the variables 'children less than six years' or 'elderly/poor/disabled' were used in targeting, with the former variable excluding less of the poor.

The results for the objective and subjective thresholds show that while the E_1 errors for the FSP are generally the same, the E_2 errors suggest that a greater proportion of the non-target group are included in the programme among the objective poor relative to the subjective poor. The latter result is also seen with respect to the E'_2 error. In keeping with Cornia and Stewart (1995), the combined index of the E_1 and E'_2 errors for Jamaica (assuming equal weights) suggest no difference in the accuracy of targeting based on the objective and subjective thresholds. In fact, the level of coverage of objectively and subjectively poor HHs is not statistically different (39.5 percent), but a larger number of HHs (53.4 percent) receiving the benefit are subjectively poor.

Table 2: Errors in Targeting Households by Category of Food Stamp Recipient

Categories	Objective			Subjective		
	E_1	E_2	E'_2	E_1	E_2	E'_2
Children less than six years	32.3	81.2	80.1	33.8	73.7	82.5
Pregnant/lactating mothers	-	-	-	-	-	-
Elderly/poor/disabled	67.9	72.8	53.8	61.5	56.2	54.6
Single member household	-	-	-	-	-	-
Family plan	-	-	-	-	-	-
Kerosene	-	-	-	-	-	-
Jamaica	60.5	61.6	12.8	62.0	46.7	10.7

Source: JSLC 1999

However, if only the E_2 error is considered, there is a significantly better outcome using the subjective threshold. This suggests that a large proportion of HHs, (15.0 percentage points), participated in the food stamp programme because they perceived themselves as poor. This result is clearly to be expected given the difference in scales between the objective and subjective thresholds. Of interest however, is the fact that a greater proportion of HHs classifying themselves as poor in 1999 seek to and successfully access the FSP (21.8 percent), relative to 11.7 percent of HHs who are indeed poor but have classified themselves as not poor.

Table 3: Percentage of Eligible Individuals Receiving Food Stamps (coverage)

Years	Children less than six years	Pregnant/lactating Women	Elderly/poor/disabled
1990	13.7	0.5	18.9
1991	23.3	7.0	26.6
1992	24.9	2.3	32.2
1993	28.3	3.4	37.7
1994	23.7	11.3	40.9
1995	17.9	4.6	35.3
1996	34.6	4.4	36.4
1997	26.6	12.5	35.8
1998	21.0	10.8	47.4
1999	17.5	1.6	45.5

Source: JSLC Report 2000.

Since the programme targets specific groups based on individual characteristics, it is also necessary to analyse how well targeted the programme is in relation to the specific categories. As argued, the eligibility of children, mothers and 'elderly/poor/disabled' is based on individual characteristics, with the former two categories being self-selected through attending public health clinics, while the latter is targeted by other programmes and referred to the FSP.

The fact that the participation rates in Table 3 are generally low is not an indictment of the targeting mechanism but, instead, is more reflective of the quotas set for the categories of beneficiaries, the programme budget and a number of factors suggested by Anderson (1993:25) which affected enrolment and the disbursement of food stamps. Also, in the case of 'pregnant/lactating women' and children, the programme discouraged the participation of those who did not use a public health clinic. However, according to Anderson (1993:29) using the 1991 JSLC data and data collected at health centres in the KMA, between ninety and ninety four percent of the applicants (women), having applied, heard nothing more concerning their application. In addition, to the extent that the health centres and other payment points are not accessible to the poor, the low participation rate may be reflective of structural problems and may be addressed by a number of initiatives suggested by Grosh, (1994:43).[13] It may also be that individuals were aware of the benefit but choose not to participate, in part, due to stigma. On the other hand, they may have been aware of the benefits but did not believe they were eligible, especially if they had previously applied but were deemed ineligible or got no response, but where a subsequent change in the programme, or in their circumstances, made them eligible.

With the exception of 'pregnant/lactating women', all of the other categories tended to be oversubscribed at one point or another. In fact, to the best of my knowledge, at no point was the 'pregnant/lactating' category fully subscribed. Grosh (1994), argues that "if pregnancy and motherhood are revered (community focus group meetings suggest that they are), then benefits for pregnant women and young children may not be stigmatised even if the program was clearly designed to benefit only the poor". This result is, however, not found in this study where pregnant/lactating mothers were reluctant to pick up food stamps for themselves, (low take-up), even though they are prepared to take stamps for their children. It is not clear why women are willing to collect food stamps for their children but not for themselves. This may however be related to the time cost of registering and the short duration (twelve months) for which 'pregnant/lactating women' may qualify for the benefit relative to the period over which children are eligible for the benefit. In this light, the principal determinant of the incidence outcomes is not the screening device built into the targeting mechanism itself, but rather the characteristics of the candidate pool and the programme budget. Raising general participation rates may require not just a change in the targeting mechanism and indicators and reducing the perceived stigma, but also an increase in the finance for the programme.

Thus far, I have analysed the performance of the food stamp programme in targeting the poor. The results suggest relatively high targeting errors, possibly due to the fact that approximately half of the beneficiaries are not subjected to any form of means-testing, and the remainder are

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[13] Grosh (1995), suggests that this may not be a problem in Jamaica where health centres are fairly widely disbursed. However, access to health centres, especially during inclement weather, was mentioned as a problem in one community studied.

based on self reported levels of consumption and social workers discretion. Better results may be obtained if all potential beneficiaries were subjected to means-testing, recognising that there are clear implications for administrative costs (not ignoring incentive effects). Reliable income data is not available and therefore a proxy means test, using a set of instruments closely related to HHs well-being to determine eligibility, may be the most appropriate. These instruments are generally selected based on their ability to predict consumption, with the added advantage of being easier to collect and verify.[14] In the next section, the performance of these proxy indicators are analysed in terms of their targeting errors. The indicators used are consistent with results that show them to be highly correlated with the well-being of HHs.

4.2. Different Means Of Identifying The Poor And Their Targeting Performance
In the discussion that follows, variables that are significantly correlated with being poor objectively and subjectively are analysed in terms of their performance in identifying the poor, based on their E_1 and E_2 errors. The choice of variables is consistent with Sen's (1995:18) argument that the causal factors underlying some functional deprivations such as physical disabilities, old age, and gender characteristics can go much deeper than income deprivation. In addition to the demographic characteristics of the household, housing condition and ownership of household durables are included. These variables may be very hard to adjust because they are beyond the control of the people involved. For this reason, they are not open to incentive effects such as in the case of reported level of consumption, limiting the incentive distortions by potential beneficiaries.[15]

Consistent with Grosh and Baker's (1995) approach, the variables are highly correlated with consumption, reliable, non-fudgable and easy to obtain and are used in an Ordinary Least Squares (OLS) regression to predict consumption.[16] The predicted level of consumption is used to estimate household poverty status and this is compared with estimates of objective and subjective poverty, and the E_1 and E_2 errors computed. Two problems with this approach are identified by Grosh and Baker (1995). The first is the fact that OLS minimizes the square difference between the true and predicted level of consumption which is different from that of minimising poverty. In addition, Baulch (2002), argues that the approach minimises the entire expenditure distribution rather than the distribution among the poor. Other methods that minimise poverty are available but do not do well when some of the predictors are continuous variables and may be more complex to implement. The appeal of the OLS method, however, is that it is easy to understand and interpret. The other problem relates to the likely endogenous right-hand side variables, but this is not of great concern since the objective is not to explain why HHs are poor.

The mean predicted values of the models in Table 4 compared favourably with estimates of mean

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[14] But there are a number of issues that needs to be considered, such as methodologies and choice of sample. The literature suggests a trade off between the simplicity of methodology and the ability of the methodology to predict the poor, while a decision needs to be made – whether to use the entire sample of HHs or a sub-sample of only the likely poor HHs.

[15] Glewwe and Kanaan (1989:10) suggest a number of properties the variables used in targeting should have. First, they must be correlated with expenditure, so that the error term is reduced, implying that reducing predicted poverty will be highly correlated with reducing actual poverty. Second, each variable or characteristic should be easily observed or verified. Third, the variable should not be easily changed.

[16] The variables used are thought to be capable of separating the poor from the non-poor, bearing in mind that too many variables increases the burden of verification with implications for costs.

consumption expenditure and are used to establish, based on the poverty thresholds, the eligibility status of the household. To assess how well the alternative scenarios in Table 4 perform in terms of targeting accuracy, the E_1 and E_2 errors are analysed. Households are categorised into four groups according to whether their true and predicted welfare level falls above or below the poverty thresholds. Households whose true and predicted consumption expenditure put them on the same side of the poverty threshold are seen as a targeting success. Those who should not and do not qualify for the benefit are likewise seen as a success. On the other hand, when true and predicted consumption expenditure fall on different sides of the poverty thresholds, a targeting error has occurred, either taking the form of E_1 or E_2. An E_1 error occurs if a HH's consumption expenditure is below the threshold but whose predicted expenditure is above and is 'incorrectly' identified as ineligible for the programme benefit. The other case of targeting error – E_2, occurs when a HH's true consumption expenditure is above the poverty threshold, but predicted consumption expenditure is below it, and the household is 'incorrectly' identified as eligible for the programme benefit.

Table 4: Models and Variables used in Simulations

Model 1: Household Demographics
Number of female children
Number of male children
Number of elderly
Household size
Head age
Head has a disability
Gender – MHHs
Union status – SFHHs
Region – Urban

Model 11: Housing Quality
Own land dwelling on
Source of water – standpipe etc.
Toilet facilities
Lighting
Telephone
Rooms
Wooden outer wall
Stone/concrete/brick outer wall

Model 111: Household Durables
Ownership of Sewing machine
Ownership of Gas stove
Ownership of Electric stove
Ownership of Refrigerator
Ownership of Fans
Ownership of Stereo equipment
Ownership of Video equipment
Ownership of Washing machine
Ownership of Television set
Ownership of Motor vehicle

Model 1V: household demographics and housing quality

Model V: household demographics, housing quality and durables

Note: the set of indicators suggested in table 4 have been shown to be strongly correlated wit the well-being of households. The use of these indicators will not result in the total exclusion of the non-target group and thus the programme may receive more political support than a scenario in which all non-poor are excluded. However attempts to monitor these indicators my prove costly and as such a smaller group of indicators that perform best will prove less costly, freeing up resources to be transferred to the poor. However, given the potential benefits to be had, households may seek to modify their behaviour or work less in order to qualify. The demographic and housing quality variables are more difficult to conceal relative to consumer durables goods that are more mobile and can be moved.

Low rates of E_1 and E_2 errors are preferable to high ones. The higher the priority assigned to raising the welfare of the poor, the more important it is to eliminate E_1 errors, while the higher the priority assigned to saving limited budget funds, the more important it is to eliminate E_2 errors or leakage. The ideal solution will, therefore, seek to minimize both types of errors, and in this respect should inform the selection of indicators used to target HHs.

While E_2 increases programme costs by giving benefits to HHs who are not the intended

recipients, Grosh and Baker (1995) argue that E_1 errors carry no budgetary costs. While this is certainly true in terms of the benefit, the cost to the society of unrealised potentials, (both as producer and consumer), and other socio-economic costs, such as health care and crime, may be substantial but is beyond the scope of this paper.[17] Social programmes generally aim to raise the welfare of the poor within some given budgetary constraint. In this light, the set of variables that reduces poverty most for any given transfer may be preferred, but, in general, this decision is usually left to the policy makers. I therefore, provide a number of scenarios with different combinations of targeting errors. The best case scenario is the one that minimises the E_1 and E_2 errors, but this is also dependent on the weights applied to the errors.

Table 5: Targeting Errors (1999)

Scenarios	Objective threshold			Subjective threshold		
	E_1	E_2	E'_2	E_1	E_2	E'_2
Pooled Sample						
Model 1	87.5	46.0	2.2	80.0	45.6	5.4
Model 11	85.0	46.7	2.7	67.9	42.4	7.6
Model 111	100.0	-	-	87.4	61.3	6.4
Model 1V	64.0	33.9	3.8	55.8	35.7	7.9
Model V	61.1	32.2	3.8	52.1	34.2	8.0
Bottom Fifty Percent of Consumption Distribution						
Model 1	69.0	50.5	16.1	72.2	36.0	14.9
Model 11	54.6	44.4	18.5	62.3	33.3	18.0
Model 111	48.0	47.0	23.5	56.0	35.1	22.7
Model 1V	48.6	44.0	20.6	56.2	31.1	18.8
Model V	42.6	40.8	20.1	52.7	29.5	18.8

Note: Model 111 for the pooled sample result in significantly higher levels of predicted consumption and no household qualified for the benefit.

The simulations in Table 5 show the trade off between E_1 and E_2 errors. The models 1 to 111, based only on household demographics, housing quality or household durables generally result in larger E_1 and E_2 errors, relative to models 1V and V where the variables are combined. This is true both when the data for all HHs and only the bottom half of the distribution are used in predicting consumption, and hold both for the objective and subjective poor.[18] Focusing on the targeting errors for the bottom half of the distribution (HHs who are more likely to seek public assistance), the models based on housing conditions and ownership of durable assets do not perform very differently from models four and five, where the variables have been combined. This suggests that indicators which distinguish the poor from the vulnerable or non-targeted HHs who may seek to register and participate in social safety net programmes are likely to result in improved targeting but there is also a trade off between the use of more or less indicators and E_1 and E_2 errors which this study does not address.

There is greater disparity in the results for the pooled sample. The results suggest that models with variables that are relatively easily verifiable, such as household demographics, perform

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[17] In fact, Cornia and Stewart (1995:371), suggest that the weights assigned to the E_1 error should be generally greater than that to the E_2 error, arguing that the failure of a nutrition intervention to reach the target population is more serious, than is leakage to the non-target group.

[18] Using the pooled sample to estimate targeting errors may not be appropriate if potential programme beneficiaries are only likely to come from a certain segment of the population.

worse than those with more variables and are somewhat more difficult to verify. This supports Glewwe and Kanaan's (1989:5) argument that more variables providing additional information improves the targeting of transfers to the poor, but, here again, the cost of the added burden of verifying these variables needs to be considered.

The use of the indicators to identify poor HHs based on the poverty thresholds have higher levels of E_1 errors for the objective poor and the pooled sample, but, at the same time, generally lower E_2 errors relative to the subjective poor. However, when the bottom half of the distribution is used, these results are reversed. This is somewhat consistent with Grosh and Baker's (1995:15) findings that higher cut-off thresholds for programme participation may result in reduced E_1 errors at the expense of higher E_2 errors. This is expected, but the results, nevertheless, allows for the determination of the influence of where the threshold is set. We now triangulate the above results using the framework of the Receiver Operating Characteristics (ROC).

Table 6: Area under the Receiver Operating Characteristics Curve

Scenarios	Objective threshold	Subjective threshold
Pooled Sample		
Model 1	0.724	0.717
Model 11	0.790	0.764
Model 111	0.777	0.748
Model 1V	0.841	0.829
Model V	0.859	0.847
Bottom Fifty Percent of Consumption Distribution		
Model 1	0.632	0.624
Model 11	0.703	0.663
Model 111	0.708	0.662
Model 1V	0.744	0.720
Model V	0.767	0.741

Here, I analyse which sets of indicators are better in terms of the two types of errors which may be made in targeting and the relative strength of each indicator in identifying the poor, using the framework of ROC curves (See Wodon, 1997 for some of the uses to which ROC analysis has been put and technical details). Using the ROC curve, sensitivity (SE) is the fraction of HHs with observed positive outcomes that are correctly classified as poor, (probability greater than 0.5 percent), while specificity (SP) is the fraction of HHs with observed negative outcomes which are correctly classified as non-poor (Wodon, 1997:2084).[19] In other words, the "ROC curve plots the probability of a test identifying a person as poor, (known as the test's sensitivity) on the vertical axis, against 1 minus the probability of the same test correctly classifying a person as non-poor on the horizontal axis (known as the test's specificity)" (Baulch, 2002:3).

A greater area under the ROC curve suggests greater predictive ability and lower probability of E_1 and E_2 errors. Consequently, the closer the ROC curve is to the 45 degree line, the weaker the

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[19] $SE = P^+ / (P^- + P^+) = P^+ / P$, where P is the number of the poor, P^- poor identified as not poor and P^+ poor correctly identified. $SP = NP^- / (NP^- + NP^+) = NP^- / NP$, where NP is the number not poor, NP^- not poor correctly identified and NP^+ not poor identified as poor . The probability of a E_1 error ('incorrectly' classifying a poor household as non-poor) is one minus SE and a type 11 error ('incorrectly' classifying a non-poor household as poor) is one minus SP.

ability of the model or variable to predict the poor. As previously established, model V and for the pooled sample, has the greater predictive ability, but it is unlikely that HHs at the top of the consumption distribution will seek to register and participate in the FSP and, as argued above, it may be more appropriate to focus on the lower half of the income distribution. As previously shown, the models based on *housing conditions* and *ownership of durable consumer goods* perform better than *household demographic* variables but the combined variables, as previously argued, outperform the others, though the differences are generally not significant. However, depending on the relative weight one placed on E_1 and E_2 errors a, somewhat, different scenario may be obtained. The shapes of the ROC curves, if superimposed on each other, are instructive here. The relative weight attached to the E_1 and E_2 errors will influence the choice of a cut-off point, which varies between zero and one. The value selected will depend on the relative importance policy-makers attach to: (1) coverage of the poor, and (2) exclusion of the non-poor. If equal weight is attached to both objectives then the appropriate cut- off for the probability of poverty (0.5) will be that which maximizes the percentage of correctly identified poor and non-poor HHs (Baulch, 2002). At this cut-off point, 86.5 percent and 80.9 percent of HHs are correctly identified as poor or non-poor using the objective and subjective thresholds, respectively, for model five; again out performing the others.

However, any social programme will be clearly hard pressed to verify all of these indicators and, therefore, in the section that follows the relative performance of each indicator in predicting the poor is analyzed. The best performing indicators are identified (See Annex 5 and Annex 6) for further scrutiny. The indicators selected include variables whose area under the ROC curve is equal to, or greater than 0.7.

Table 7: Selection of Indicators that Perform Best in Identifying Poor Households

	Objective			Subjective		
	E_1	E_2	E'_2	E_1	E_2	E'_2
Head age (average)	42	-	-	40	-	-
			Percent			
Potable water	37	69.4	29	41.2	58.8	26.9
WC Toilet facilities	23.5	70.8	37.6	27.8	60.2	35.1
Electric Lighting	51.7	58.8	14	-		
Telephone	13.5	75.3	53.2	17.6	66.0	51.2
Ownership of Gas stove	46.7	63.9	19.1	-		
Ownership of Refrigerator	24.1	70.3	36.4	31.5	61.3	34.9
Ownership of Fans	15.1	73.5	47.8	20.6	64.2	45.9
Ownership of Television set	35.7	66.4	25.7	44.7	58.2	24.8

Note: the E_1, E_2 and E'_2 errors for the variables 'elderly/poor/disabled' and 'children less than six years' used by the food stamp programme are 65.1, 69.2 and 11.5 percent and 62.2, 78.5 and 22.6 percent respectively.

Consistent with Baulch (2002:7)'s findings for rural Vietnam, household demographic characteristics perform relatively poorly as poverty indicators. The best performing variable within this group is the *age of the household head*. The average age of the head of objectively poor HHs is forty-two years compared with thirty-one for heads of non-poor HHs. Similarly, the average age of the head of subjectively poor HHs is forty years and for the non-poor thirty years. The *housing quality* and *consumer durable* variables that are observable by programme officials perform better in identifying the poor, and the E_1 and E_2 errors of some of these variables are

shown in Table 7. Table 7 shows that, while the lowest proportion of poor HHs own a *landline telephone*, the highest proportion of non-poor is also without this facility, and the opposite result is seen for the variable *lighting*. Similarly, for the subjective poor, the variable *ownership of a land telephone* has the lowest E_1 error, but the highest level of E_2 error. The result is, however, the converse for the variable *ownership of television set*. Here, the results clearly point to the trade off between the two types of errors in targeting, with generally lower E_1 errors for the objective poor. The relative level of the errors is consistent with results in Table 5 when the lower half of the consumption distribution is used to predict the targeting errors.

The E_1 errors of the selected variables are generally significantly lower than the errors if the variables 'child less than six years' and 'elderly/poor/disabled' are used to target poor HHs. In addition, in keeping with the argument that some combination of indicators performs better in targeting the poor than any single indicator (Baulch 2002; Grosh and Baker 1995; Glewwe 1992), the selected variables were combined and the targeting errors analysed. In general, the combined variables perform as well as the variables used in scenario IV and the lower half of the consumption distribution, both in terms of the targeting errors and HHs correctly classified as poor.

The results suggest that ownership of household durable assets is generally less among the poor and may be used, on the whole to screen HHs out of the programme. Although consistent with the literature on targeting, this does not reflect the reality in Jamaica, according to the participants of focus group meetings (food stamps and potentially PATH beneficiaries), here individuals argued that 'ownership of household durables', 'state of housing', and 'sanitary facilities' were not as important as 'employment status' and 'occupation of the head of the household' in establishing need. Respondents argued that, in many cases, their household durables are acquired as gifts, through great sacrifice, or hire-purchase – depriving the household of other necessities. There was a general consensus that the poor are more likely to be unemployed, have a large number of children, 'live hand to mouth' – experience difficulty providing food for their family or be elderly persons living alone, or caring for grand children. When combined, these factors compound already difficult situations as expressed by one participant; "I am telling you the truth, I have seven children and I am the sole provider for them so I need assistance ….because work is difficult to find" ("*Mi nah lie to yuh, mi hav seven pickney and mi nuh hav nuh faada fi dem, so dat's why me really tek it up....cause work hard fi get*").[20] Individuals argued that these conditions were much more important than the type of durables owned by the HH. To better serve the poorest of the poor, it was suggested that attention be given to the method of how household durables were acquired and their general condition (from the author's experience in the field, gas stoves which may be considered as a fire hazard were used for cooking by some HHs).[21] Results based on the lower half of the consumption distribution, however, suggest that household durables, as a group, perform better than demographics and housing condition indicators, in terms

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[20] This comment was made on the 10th February, 2003 by a participant in a focus group meeting held by the author to determine the problems with the pilot phase of the PATH programme.

[21] For example, during the latter part of 1998, 5,000 gas stoves with fittings and gas cylinders were distributed to food stamps beneficiaries across Jamaica in response to the removal of the subsidy on kerosene. The weights assigned to the ownership of gas stoves in current scoring formulae used by the PATH do not reflect this fact. In addition, many poor HHs use a combination of energy sources depending on the weather and the occasion. During inclement weather or on special occasions they will tend to use their gas stove reverting to other sources of energy for general cooking.

of E_1 errors, for both objective and subjective thresholds. Yet these indicators are more mobile and ownership may be concealed relatively easy.

The importance attached to employment by respondents is appreciated, but in the context of a large informal economy, there are likely to be difficulties verifying this variable where individuals have a clear incentive to lie, and since household consumption is positively influenced by the number of household members employed, the predictors used may perform well.[22] Nonetheless, the influence of including the variable, *the proportion of unemployed adults*, clearly points to an improvement in the predictive power of the models, although the influence of the variable, on the E_1 and E_2 errors for model V, shows no change in the errors.

An issue raised by Grosh and Baker (1995), and also relevant in this work, is, "who is missed by targeting? They recognised that while it is unsatisfactory to fail to identify some HHs who are below the poverty line, the error is less grave if the excluded HHs are just below the poverty line rather than at the bottom of the distribution. Using model V, the excluded objective poor are equally divided between deciles one and two (51.0 and 49.0 percent respectively), while just 32.0 percent of the excluded subjective poor are in the first deciles. These results are consistent with the tendency of some poor HHs to classify themselves as not poor, and to abstain from participating in programmes targeted at the poor. The results for the objective poor are fairly comparable with those of Grosh and Baker (1995), where their best case scenario shows that an equal amount of the excluded poor were in deciles one, two and three where thirty percent of the population were classified as poor in 1989.[23] An interesting contrast between the results, however, is the fact that they used per capita consumption deciles, not accounting for nutritional equivalence weights or economies of scale within HHs.

Targeted schemes may be designed to have low errors where the target population has easily verifiable characteristics that are not shared by the non-target population. In reality, this is rare, and characteristics tend to be more evenly spread across the population, so that efforts to reduce one type of error invariably lead to an increase in the other. The errors incurred in targeting are only one aspect of a social programme. To judge its performance, requires also considering the administrative cost that is associated with the targeting/ed outcomes. The relationship between administrative cost and expected costs of different targeting approaches is analysed in the next section.

4.3. Programme Administration And Cost

The FSP was part of a wider Public Assistance Programme providing assistance to poor and vulnerable households and those who had suffered personal misfortunes. Although separate budgetary provisions were made for the FSP, the staff members of the MLSS Public Assistance Department had responsibility for other programmes in addition to the FSP. The MLSS was responsible for the overall administration of the programme (means testing, registration of participants, distribution of stamps, verification of need etc.). The Ministry of Health facilitated the registration and limited distribution of stamps to children and 'pregnant/lactating women',

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[22] Anderson and Witter (1994:26-7) estimated that the proportion of females and males self employed in 1989 was 33 percent and 42.2 percent respectively. Estimates for 1996, based on Own Account Workers suggest that approximately 35 percent of the labour force is self-employed.
[23] Deciles one accounted for approximately a third of the combined share of excluded poor.

primarily, by making health clinics available for this process, while the Ministry of Local Government, through its Poor Relief Officers, facilitated the identification and enrolment of indigent HHs.[24] A number of donor agencies were also involved in several aspects of the programme and at different points over its lifetime. Part of the benefits paid by the government was reimbursed by the donors, (support was provided by the World Food Programme (WFP) for children and pregnant mothers, while United Nations Development Programme (UNDP) supported all categories except kerosene), but technical support tended to be paid for, directly, by the responsible donor on certification of the PIOJ and the MLSS.[25] It is clear that the food stamp programme involved the cooperation of several local and international institutions and, as such, the MLSS budget does not reflect the aggregate cost of the programme; more so, this is not done by any agency (Grosh, 1994). I believe that the FSP budget from the Estimates of Government Expenditures excludes costs relating to monitoring and evaluating the programme but does include general administrative costs and benefits.[26] Food stamps were also used for emergency relief, such as in the aftermath of hurricanes (e.g. Gilbert in 1989), floods etc. but none of these took place during the 1990s, the period on which this analysis focuses.

As indicated, the food stamp programme was part of the general Public Assistance Programme, and while there were separate budgetary provisions, the same staff and facilities were used. The Staff members interviewed claimed that they spent the overwhelming majority of their time on activities relating to the FSP. With the exception of the Management Information System (MIS) Department, (which spent 30 percent of its time on FSP), staff spent between 70 percent and 95 percent of their time on the FSP, most of which, is on activities relating to the payment of beneficiaries. The latter activity, including general administrative matters, occupied approximately 80 percent of the time allocated to FSP activities. The remaining time was divided between identifying and registering new beneficiaries and validating existing ones. The time allocated by the regular staff members to these activities was, invariably, inadequate and special initiatives were, therefore, mounted periodically. Recruitment of beneficiaries, primarily, focused on 'pregnant/lactating women' and children and was conducted in 1992, 1994 and 1996-97. Re-certification of all groups of beneficiaries took place after the suspension of the programme in 1989, and again in 1998-99, 1999-2000 and 2000-2001. The initiatives in the latter periods reflect efforts to clear the rolls of non-poor HHs as part of the plans to bring the programme to an end, transferring some of its beneficiaries to the new PATH programme. These special initiatives resulted in periodic spikes in the share of administrative costs (See Figure 2) and the effect on the fineness of targeting is likely to be felt over some indeterminate period.

The cost of targeting can be disaggregated into administrative, behavioural and political costs (Gaiha, *et al*. 2001 and Grosh, 1994) but this distinction is not applicable in this research. It is also recognised that the level of administrative cost varies with the type of targeting mechanism used, the level of information and institutional capacity, and the personnel and equipment needed

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[24] Grosh (1994:13), argues that health care workers refused to do the extra work of registration or to distribute food stamps on the grounds that they were already overworked and underpaid.

[25] WFP food was monetized locally on the premise that the distribution of food in kind would be too costly and a less effective way of assisting the poor.

[26] However, according to Anderson (1993:7), mass registration of mothers and children in 1992 was funded by the WFP, but it was not stated whether this expenditure was reimbursed by the WFP or paid for directly out of its budget. Discussions held with officials of the MLSS seem to suggest that this was a reimbursable expenditure by the MLSS and as such included in its budget.

to carry out targeting. The total administrative cost can be disaggregated into targeting cost (which is the cost incurred in the screening process that determines who benefits); the costs incurred in keeping track of the beneficiaries once enrolled (validating and recertifying beneficiaries – monitoring); and the payment of benefits. The latter costs are part of the general administrative cost not directly related to targeting, but may be a function of the approach used. While these components of administrative costs are incurred, the MLSS aggregates its costs using general categories such as wages, materials and benefits, and therefore, it is not possible to disaggregate administrative cost as outlined.[27] However, the interest is not in the different components of administrative costs, but rather, the aggregate share of administrative cost in the programme budget and how this varies with the targeting approach used.
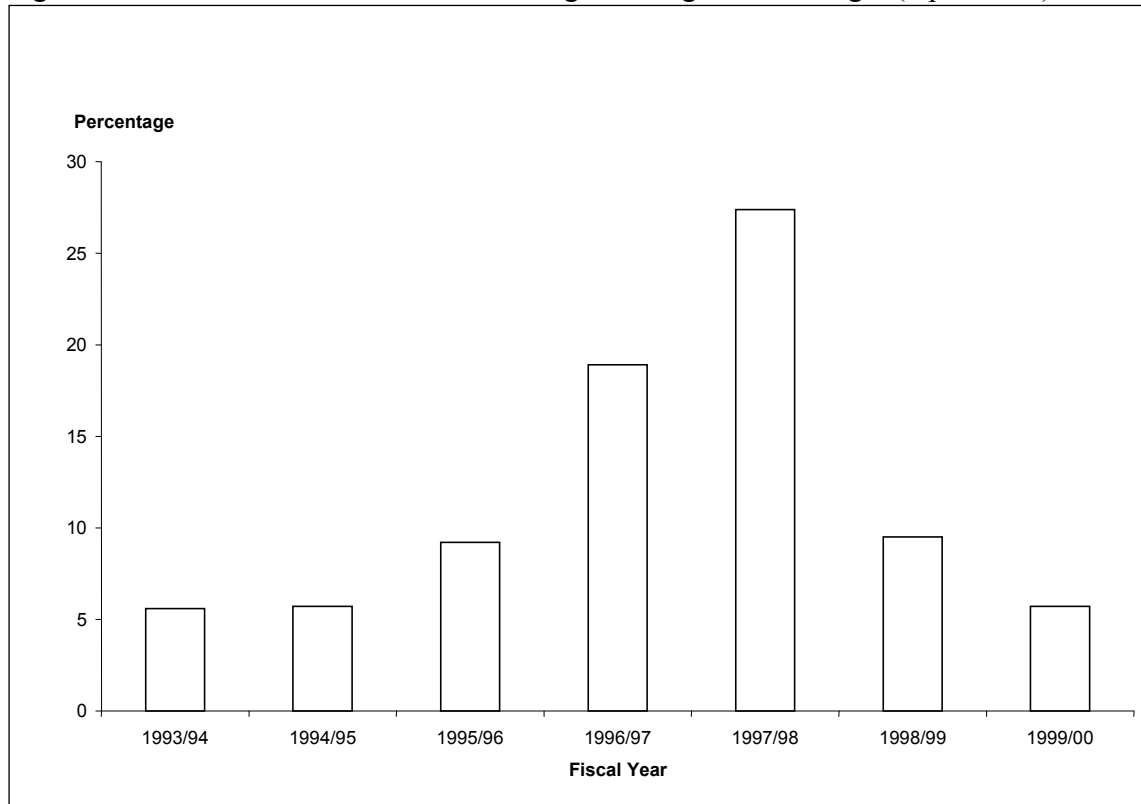
Over the fiscal years 1993/94 to 1999/00, the share of administrative cost varied between a low of 5.6 percent and a high of 27.4 percent, averaging 11.7 percent over the period, as shown in Figure 9.2. This is consistent with the 10 percent reported by Grosh (1994:38) and the upper limit of the optimal share of administrative cost. However, if it is assumed that employees of the Public Assistance Department spend approximately 70 percent of their time on FSP activities and estimate the same share in administrative cost is allocated to the FSP, the share of administrative cost now varies between 6.5 percent and 25.7 percent, averaging 15.4 percent over the period. These results are further unpacked to establish how actual administrative costs vary with different targeting approaches.

To address low rates of take up by 'pregnant/lactating women' and children, in 1992, Ja$1.3 million was expended on registering new beneficiaries resulting in an increase in the numbers targeted by 66.4 percent and 37.5 percent, respectively, compared to 1991, while the total number of beneficiaries increased by a mere 14.1 percent.[28] Clearly, some women and children would have been withdrawn from the FSP during the targeting process, but a rough average of the cost of registering the additional number of beneficiaries suggest an average cost of targeting of approximately Ja$29.1 or US$1.3 per beneficiary. During this period, the share of administrative cost was 7.8 percent but declined to its lowest level in 1993, as shown in Figure 2. The decline in the share of administrative cost was probably due to the increase in value of the benefits to each category of beneficiary by an average of 25 percent, and supports the argument that the share of administrative cost is also a function of the value of the benefit distributed.

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[27] It is also important to recognise that the food stamp programme reflects the cooperation of several local and international institutions and as such the MLSS budget may not reflect the aggregate administrative cost and this is not done by any of the agencies. But invariably the costs incurred by the donors tend to be related to monitoring and evaluation of the programme.

[28] The maximum age limit for children qualified for the FSP was increased from five to six years and pregnant women were allowed to automatically move into the category for lactating women, removing the need to reapply on the birth of their child.

Figure 2: Administrative Cost as a Percentage of Programme Budget (alpha ratio) 1993/94-1999/00.

However, while the total number of beneficiaries in 1993 remained generally unchanged relative to 1992, the number of 'pregnant/lactating women' registered on the programme declined by approximately, 6000 beneficiaries, with a commensurate increase in the number of children targeted. This suggests that the benefit may have been transferred from the mothers to their children and underscores the short duration 'pregnant/lactating women' benefit from the programme and the efforts needed to maintain their numbers. We return to this issue at a later stage in the paper.

In 1994, administrative costs increased by 2.5 percent in response to initiatives to register 'pregnant/lactating women', but as a share of the total budget it was not significantly different from 1993. The initiatives resulted in a 549.4 percent increase in the number of 'pregnant/lactating women' targeted, in contrast to a general decline in all other categories of beneficiaries. This result seems to suggest a trade off of activities, with the increase in the targeting of 'pregnant/lactating women' being done somewhat at the expense of other categories, especially the category 'children less than six years' (See Annex 1), and may have been a deliberate strategy to address the nutritional concerns of infants or babies. This result also highlights the relationship between the two categories, where 'pregnant/lactating women' are recruited to the programme and after a maximum period of one year, their child is likely to be placed on the FSP. In other words, the former category represents a source from which children are transferred to the FSP. These two categories also reflect the highest level of beneficiary turnover.

Administrative cost increased by 40.7 percent in 1995/96 in response to the introduction of the Skills 2000 Programme. This programme was an extension of the strategy which began in 1990 to remove able-bodied beneficiaries by making Rehabilitation Grants available to them. The Skills 2000 programme provided beneficiaries or members of their household with initial capital to establish micro enterprises and basic numeric and literacy skills training to equip the prospective entrepreneurs. The intention was to make the FSP available to HHs in greater need and with fewer prospects of economic engagement. This strategy of establishing HHs' needs and capabilities possibly provides an indication of the level of expenditure required for the verification and re-certification of beneficiaries.

The increase in the share of administrative costs in fiscal year 1996/97 seems to have been caused by a combination of two factors (See Figure 2): (1) a reduction in the amount of benefits paid, and (2) an absolute increase in total administrative costs by approximately two-fold. This is also consistent with, as indicated, initiatives to recruit new beneficiaries over the period 1996-97 and an increase in the number of beneficiaries registered and the absolute amount of benefits paid in 1997/98. Initiatives were primarily directed at increasing the number of 'elderly/poor/disabled' and, some elderly beneficiaries placed in the category 'single member household' were transferred to the correct category. The increase in administrative cost in 1997/98 was also in response to the introduction of a new type of benefit: the 'kerosene stamp', which necessitated screening of the 'Family Plan' category and shifting of some HHs to the 'Kerosene' category. At the same-time, the number of 'pregnant/lactating women' and children increased by 157 percent and 290 percent, respectively, in 1997/98. As a result, the number of 'pregnant/lactating women' targeted was at its highest level since the inception of the programme. But, it is also evident, that administrative cost was also at its highest level, increasing by 163.9 percent in fiscal year 1997/98. The reduction in the share of administrative cost in fiscal years 1998/99 and 1999/2000 is as a result of a greater percentage reduction in the level of administrative cost relative to the total benefits. On average, administrative cost declined by 63.6 percent, while the corresponding decline in total benefits was 12.9 percent. Comparison of administrative cost relative to the benefit received for the period under review shows that while total benefits increased by a mere two percent, total administrative cost increased by 30 percent. This result suggests that it may be relatively easier to allow the value of the benefit to slip in response to inflationary pressures, given the influence of Unions and other market forces on the elements of administrative cost.

The use of indicators such as 'pregnant/lactating women' that require frequent registration and monitoring of beneficiaries are likely to result in increased costs of administration. Savings may have been made by combining this indicator with 'children less than six years', reducing the need to register in some cases the same household twice. This is particularly important since changes in administrative cost seemed to have been influenced by the registration of women and children.

The literature does not provide a standard by which to judge the share of administrative cost, but the average level attained by the FSP appears to be consistent with the results for other programmes (Cornia and Stewart, 1995:367) and the range of the optimum suggested in this paper. This outcome may not only be related to programme efficiency but, also, to the fact that the benefits were very low, and the time cost of picking up the benefit, both in terms of distance travelled and waiting time, was relatively high (Devereux, 2002:5; JSLC Report 2000), averaging 0.6 hours and 1.9 hours, respectively. Taking the minimum wage of Ja$30 dollars per hour in

2000, the average time expended collecting the stamp is equivalent to approximately Ja$75 dollars, to which an average of Ja$43 dollars for transportation should be added. The average annual net value of the stamp received by beneficiaries was therefore Ja$633 dollars which is 1.4 percent of the poverty line in 1999, or 0.5 percent of per capita average consumption of HHs in receipt of food stamps. The resulting disincentive effect, coupled with the fact that approximately half of the FSP was based on self-targeting, may have reduced the need for continuous screening and verification of need.

The relationship between the indicators and approach used to target FSP beneficiaries and administrative cost provides some indication of the likely cost of using the set of indicators suggested above, whether separately or as a composite index (the latter approach is recommended). It is not, however, possible to estimate the exact level of costs but it is likely that the share of administrative costs will reflect the sequencing and implementation of the approach, the level of benefit and the quality of the administrative machinery. It is also likely that in the initial phase, the cost of administering the programme will escalate as seen during the pilot phase in the PATH programme, in which cost of targeting and enrolment was over half total expenditure. It is important that in the medium to long term, cost is reduced substantially within the framework of the optimal share of administrative cost if the poverty reducing effect is to be optimised.

5. CONCLUSION
It is not unusual for social programmes to have multiple objectives (Atkinson, 1995; van de Walle, 1996) and this is seen in the FSP where the main objective was to supplement the income of the poor, but equally important was the objective of improving the nutritional level of mothers and children. While the latter objective was pursued through the requirement of attendance at public clinics, poor HHs were, generally, subjected to means tests. The income threshold used in means testing was grossly inadequate but may have been deliberate and in keeping with the available resources. But interestingly, the indicators used by the FSP that performed best, both in terms of the E_1 and E_2 errors, are the 'children less than six years' and the 'elderly/poor/disabled', neither of which were subjected to means testing, and HHs who classified themselves as poor were more likely to receive the benefit. The paper, however, illustrated that targeting may be improved by subjecting all HHs to a proxy means test using housing quality and ownership of consumer durables indicators; these sets of indicators performed equally well relative to targeting based on these indicators plus household demographic characteristics.

While it is important to reduce the E_1 errors associated with targeting it has been demonstrated that this comes at a cost in terms of the share of the programme budget allocated to administrative cost and the poverty reducing effect. The fact that a programme is well targeted does not mean that it is a cost effective way of reducing poverty. Several elements of costs need to be considered, among them the share of programme budget allocated to administrative cost, the optimum of which is shown to vary between zero and eleven percent. The latter cost for the FSP has been shown to increase substantially in response to initiatives to register and re-certify beneficiaries. These initiatives are conducted periodically and while they reflect substantial increases in costs for a given period, the improvement in targeting is likely to persist for some time. This result clearly has implications for what level of cost and over what period of time it is considered optimal. In addition, arriving at the optimal share of administrative cost does not

guarantee an optimising of the poverty reduction effect. The later result also depends on the indicators used, the implementation of procedures and the administrative machinery necessary to ensure that those in need are the primary beneficiaries. The presumption, however, is that aspiring towards a share of administrative cost that is optimum is the right step towards achieving the desirable poverty reducing effect and targeting outcomes.

At any given time, the level of administrative cost may reflect initiatives being pursued and its share in the programme budget may not, accurately, reflect the general performance of the programme. It is, therefore, important that the share of administrative cost be placed within the overall context of the programme, the phase of implementation and initiatives pursued. But, in the medium to long run, it is important that efforts are made to bring the share of administrative cost in line with the suggested optimal level.

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Annex 1: Registration of Beneficiaries of the Food Stamp Programme, 1991-2000

Year	Pregnant/ Lactating Women	Children 0-6 years	Elderly/Poor/ Disabled	Single Member HHs	Family Plan	Kerosene	Total
2000	2 924	75 563	92 799	18 368	14 974	22 231	226 861
1999	2 943	85 354	96 046	21 631	18 317	28 320	252 611
1998	1 821	92 491	98 440	22 512	19 105	28 933	263 302
1997	30 833	114 964	98 784	22 775	19468	29 674	316 480
1996	12 000	29 485	103 917	50 331	42 369	-	238 102
1995	15 000	98 730	39 103	71 691	48 965	-	273 489
1994	21 437	127 815	37 920	71 379	18 676	-	277 228
1993	3 301	151 271	38 411	73 809	19 109	-	285 901
1992	9 153	145 724	38 129	77 645	15 015	-	285 666
1991	5500	106009	16263	6981	15379		250465

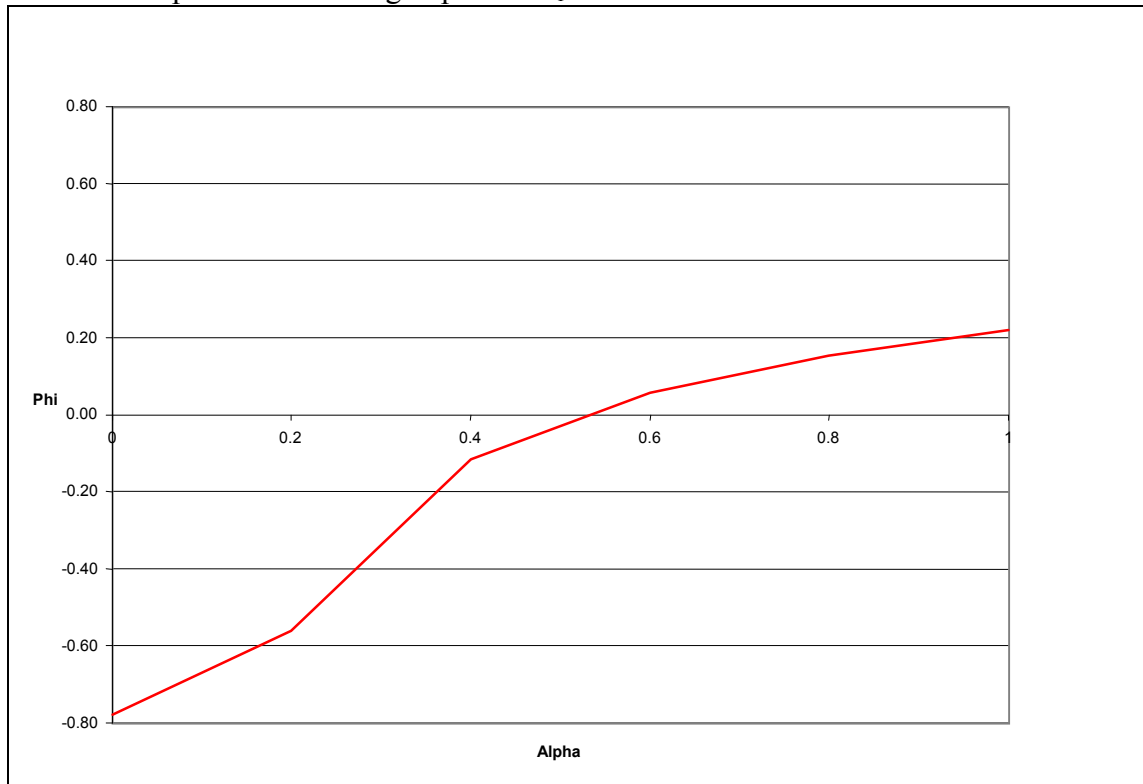Source: Economic and Social Survey of Jamaica and the Ministry of Labour and Social Security.
Note: (1) the maximum age limit for children to qualify for the FSP was extended from age five to six years; (2) disabled persons became officially listed as beneficiaries and were placed in the category elderly/poor/disabled; (3) in 1995, 'Single Member HHs' who were elderly individuals were placed under the correct category of 'Elderly/Poor/ Disabled'; (4) the 'Kerosene' category was introduced in 1997, resulting in a shift of some of the HHs in the 'Family Plan' category and a few addition beneficiaries.

Annex 2: Category of Food Stamp Programme Recipients and Value of Food Stamps

Categories	Proportion receiving benefit			Annual value of stamp			Percentage of food poverty line		
	1999	1997	1993	1999	1997	1993	1999	1997	1993
Pregnant/lactating women	1.2	9.7	1.2	1260	1260	900	5.1	5.9	9.5
Children under six years	33.8	36.3	53.0	900	900	720	3.7	4.2	7.6
Elderly/poor/disabled	38.0	31.2	13.4	1440	1440	1080	5.9	6.7	11.4
Single member household	8.6	7.2	25.8	1260	1260	900	5.1	5.9	9.5
Family plan	7.3	6.2	6.7	1980	1980	1440	8.1	9.3	15.1
Kerosene assistance	11.2	9.4	-	1980	1980	-	8.1	9.3	
Jamaica (weighted)				1341	1298	866	5.5	6.1	9.1

Note: the average value of benefit received as a proportion of the poverty line was 2.9, 3.5 and 5.4 percent for 1999, 1997 and 1993 respectively.

Annex 3: The Impact of Increasing Alpha on E_1 Errors

Annex 4: The Optimum Share of Administrative Cost and the Weighting of Targeting Errors

Optimum share of Administrative Cost	E_1 Weight	E_2 Weight
0	0	1
0	0.025	0.975
0.01	0.05	0.95
0.01	0.075	0.925
0.01	0.1	0.9
0.01	0.125	0.875
0.02	0.15	0.85
0.02	0.175	0.825
0.02	0.2	0.8
0.03	0.225	0.775
0.03	0.25	0.75
0.03	0.275	0.725
0.03	0.3	0.7
0.04	0.325	0.675
0.04	0.35	0.65
0.04	0.375	0.625
0.05	0.4	0.6
0.05	0.425	0.575
0.05	0.45	0.55
0.05	0.475	0.525
0.06	0.5	0.5
0.06	0.525	0.475
0.06	0.55	0.45
0.06	0.575	0.425
0.07	0.6	0.4
0.07	0.625	0.375
0.07	0.675	0.325
0.08	0.7	0.3
0.08	0.725	0.275
0.08	0.75	0.25
0.09	0.775	0.225
0.09	0.8	0.2
0.09	0.825	0.175
0.09	0.85	0.15
0.1	0.875	0.125
0.1	0.9	0.1
0.1	0.925	0.075
0.1	0.95	0.05
0.1	0.975	0.025
0.11	1	0

Annex 5: Accuracy of Indicators in Targeting the Objective Poor[29]

Model 1: Household Demographics	All Jamaica	Urban	Rural
Number of female children	0.5438	0.5404	0.5314
Number of male children	0.5709	0.5904	0.5486
Number of elderly	0.6232	0.5715	0.6416
Household size	0.577	0.5726	0.5663
Head age	0.6623	0.6329	0.6643
Head has a disability	0.5221	0.5018	0.5312
Gender – MHHs	0.5394	0.552	0.5461
Union status – SFHHs	0.5214	0.5122	0.5519
Region – Urban	0.6018		
Model 11: Housing Quality			
Own land dwelling on	0.5022	0.544	0.5004
Source of water – standpipe etc.	0.6703	0.6018	0.6416
Toilet facilities	0.6945	0.6817	0.6408
Lighting	0.6715	0.6743	0.6585
Telephone	0.6644	0.7	0.5863
Rooms	0.5861	0.6278	0.5657
Wooden outer wall	0.571	0.5702	0.5621
Stone/concrete/brick outer wall	0.5319	0.5505	0.5158
Model 111: Household Durables			
Ownership of Sewing machine	0.5438	0.554	0.533
Ownership of Gas stove	0.6709	0.6588	0.6679
Ownership of Electric stove	0.5067	0.5	0.5024
Ownership of Refrigerator	0.697	0.6868	0.6829
Ownership of Fans	0.686	0.6849	0.6438
Ownership of Stereo equipment	0.5732	0.5931	0.543
Ownership of Video equipment	0.6003	0.6056	0.5837
Ownership of Washing machine	0.5407	0.5616	0.5154
Ownership of Television set	0.6927	0.6764	0.6896
Ownership of Motor vehicle	0.569	0.5854	0.5449

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[29] The ability of each variable to predict objectively poor HHs was analysed using the framework of the ROC curves and those with area under the curve of 0.6 (rounded to one decimal place) and greater were used to predict HHs consumption. The results were then compared with actual consumption expenditure and the errors of identification established. For the objective poor, the type 1 error is 63.0 percent, the type 11 error is 3.8 percent and leakage 33.7 percent. The accuracy of these variables in predicting poor HHs is also analysed restricting the sample of HHs to those in the lower half of the consumption distribution. The results point to type 1 and type 11 errors of 44.2 and 20.6 percent respectively and leakage of 42.0 percent.

Annex 6: Accuracy of Indicators in Targeting the Subjective Poor[30]

Model 1: Household Demographics	Jamaica	Urban	Rural
Number of female children	0.554	0.5508	0.5446
Number of male children	0.5808	0.6082	0.5529
Number of elderly	0.6077	0.5745	0.6207
Household size	0.5998	0.6048	0.5871
Head age	0.652	0.6389	0.6468
Head has a disability	0.5209	0.5029	0.5295
Gender – MHHs	0.5248	0.5396	0.5265
Union status – SFHHs	0.514	0.506	0.5277
Region – Urban	0.5849		
Model 11: Housing Quality			
Own land dwelling on	0.5042	0.5541	0.5198
Source of water – standpipe etc.	0.6592	0.5929	0.6448
Toilet facilities	0.6857	0.6697	0.6422
Lighting	0.6333	0.6362	0.62
Telephone	0.6546	0.6765	0.5874
Rooms	0.5605	0.5802	0.5489
Wooden outer wall	0.572	0.5707	0.5647
Stone/concrete/brick outer wall	0.5272	0.5461	0.5089
Model 111: Household Durables			
Ownership of Sewing machine	0.544	0.5519	0.5342
Ownership of Gas stove	0.6353	0.6128	0.6413
Ownership of Electric stove	0.508	0.5	0.5036
Ownership of Refrigerator	0.6683	0.6571	0.6576
Ownership of Fans	0.6677	0.6675	0.6291
Ownership of Stereo equipment	0.5775	0.6037	0.5424
Ownership of Video equipment	0.5919	0.6216	0.5589
Ownership of Washing machine	0.5431	0.5655	0.5156
Ownership of Television set	0.6527	0.6381	0.6508
Ownership of Motor vehicle	0.576	0.5979	0.5478

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[30] The ability of each variable to predict poor HHs based on the subjective threshold was also analysed using the framework of the ROC curves and those with area under the curve of 0.6 (rounded to one decimal place) and greater were used to predict HHs consumption. The results are then compared with actual consumption expenditure and the errors of identification established. For the subjective poor the type 1 error is 52.7 percent, the type 11 error is 8.4 percent and leakage 35.7 percent. The accuracy of these variables in predicting poor HHs is also analysed restricting the sample of HHs to those in the lower half of the consumption distribution. The results point to type 1 and type 11 errors of 19.7 and 52.3 percent respectively and leakage of 40.6 percent.

Annex 7: Predicted Errors Based on Selected Variables

	Objective			Subjective		
	E_1	E_2	E'_2	E_1	E_2	E'_2
Variables selected based on area under ROC curve	72.1	36.9	3.3	61.4	39.9	8.2
Lower half of consumption distribution	45.1	43.6	21.6	22.3	41.0	51.5
Correctly classified	84.7			79.3		

Annex 8: Administrative Cost as a Percentage of Programme Budget

Fiscal year	Share of administrative cost	Fiscal year	Share of administrative cost
1982	52.0	1991	68.0
1983	54.0	1992	-
1984	-	1993	5.6
1985	4.9	1994	5.7
1986	6.5	1995	9.2
1987	6.5	1996	18.9
1988	12.8	1997	27.4
1989	29.7	1998	9.5
1990	-	1999	5.7

Source: Government of Jamaica Estimates of Expenditure