Chapter 9

Targeting Effectiveness of Safety Net Programs in Senegal

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Following a decade of strong economic performance beginning in the mid-1990s, Senegal suffered from a succession of domestic and external shocks, many of which were exogenous. In the decade after 1995, Senegal enjoyed robust growth of per capita gross domestic product (GDP), averaging 5 percent annually in real terms. The sudden change in economic performance, however, exposed the country's vulnerabilities and the government's limited capacity to respond effectively to these shocks. First, the run-up in oil prices, starting in 2007, slowed the economy, increased inflation, and resulted in a significant deterioration in Senegal's external and fiscal positions. Second, unfavorable rains prompted a sharp decline in agricultural production for two successive years, reducing the availability of food. Further, weaknesses in fiscal policy hurt private growth, especially in the construction and public works sector, and the onset of the global recession produced further headwinds against a rapid rebound from previous shocks. Each of these successive crises had its own time frame, channels of transmission, economic scale, and social or regional targets; yet, taken together, they have accounted for much of Senegal's weak economic performance in recent years.

In response to these successive crises and the rising costs of fuel and food, the government introduced general tax breaks and subsidies on rice and other commodities in 2007. These measures proved to be very expensive (between 3 and 4 percent of GDP) and poorly targeted to the poor. By the end of 2008, the government, under severe budget constraints, lifted most of the general subsidies. This experience underscored the need for effective programs to protect the most vulnerable from shocks and destitution and generated interest in developing a national safety net system.

By the end of 2008, however, the government had accumulated domestic debts to the private sector equivalent to more than 3 percent of GDP, forcing a

strong tightening of fiscal policy. The onset of the global financial crisis in 2008, its deepening in 2009, and continued electricity shortages further contributed to the general slowdown of the country's economic activity.

Poverty, Vulnerability, and Social Assistance Response

Poverty has remained elevated, with only slight progress made since 2005. Poverty rates in Senegal declined from 55.2 percent to 48.3 percent between 2001 and 2005, but barely fell during the five years after that, reaching 46.7 percent in 2011. Growth in GDP per capita has been less than 1 percent per year for the past five years, well below the average for Sub-Saharan Africa.

Despite small gains in poverty reduction overall, extreme poverty has risen significantly. Defined as the proportion of the population whose total consumption is less than the costs of a food basket that provides minimum calorie requirements, extreme poverty has more than doubled over the last 10 years, rising from 7 percent in 2001 to 15 percent in 2011.

Poverty remains concentrated in rural areas. In Senegal, 57 percent of the poor population is located in rural areas, and the poverty rate in rural areas is more than twice the rate in urban Dakar (26 percent). High rates of rural poverty are driven largely by low productivity in agriculture. About 62 percent of people living in households with a head whose main occupation is in agriculture are poor, compared with 33 percent for other occupations. Between 2001 and 2011, poverty rates fell fastest in the capital of Senegal, where it declined 12 percentage points, compared to a fall of 8 and 4 percentage points in rural areas and "other urban centers," respectively.

The main household characteristics associated with poverty are related to education, family size, and gender. About 83 percent of the poor live in households headed by a person with no education, a figure that has not changed over the past 10 years. Poverty rates among persons living in households whose head has completed a primary education declined from 43 percent in 2005 to 34 percent in 2011. Also, larger household size (usually headed by a male) remains strongly associated with higher poverty: 78 percent of households with 20 members or more are poor. Female-headed households are relatively better off and tend to be smaller. About a quarter of all Senegalese live in a household headed by a woman.

Vulnerability

Table 9.1 summarizes the distribution of the vulnerable population—defined as the disabled, the elderly, early marriage, and children not in school.

Poverty is higher among the disabled population and the elderly without family support. There are an estimated 181,500 disabled persons in the country,

Table 9.1 Number of Vulnerable Individuals and Households in Senegal, by Poverty Level

	Individuals			Individuals in a household with a vulnerable person			Households		
Characteristic	Poor	Nonpoor	Total	Poor	Nonpoor	Total	Poor	Nonpoor	Total
Disabled adults	9,260	10,214	19,474	128,705	104,574	233,279	7,809	9,407	17,216
Disabled children	79,224	82,751	161,974	772,140	630,322	1,402,461	56,166	63,687	119,853
Elderly	107,131	121,751	228,883	1,151,060	1,031,780	2,182,841	79,617	101,355	180,972
Early marriage	6,355	5,812	12,167	91,531	59,440	150,971	5,965	5,625	11,590
School-age children not in school	702,330	635,710	1,338,040	2,119,480	2,121,707	4,241,186	160,495	222,571	383,066

Source: Echevin 2012.

nearly half of whom are under the national poverty line. Similarly, almost half of the elderly are poor, and they tend to be highly reliant on family support.

Vulnerable children (defined as those with a disability, in early marriage, uneducated, and poor) are in highly precarious situations. Vulnerable children account for about 1.65 million poor, with almost 61 percent living in extreme poverty. In addition to these groups, 34 percent of orphans do not attend school, and, along with other vulnerable children, are often engaged in child labor. Among children 5–17 years of age, 72 percent are involved in labor activities. Many of these are engaged in family production, especially in rural areas.

Formal social security coverage remains limited, reaching only 13 percent of the population. This includes 6.2 percent covered by a formal pension, 3 percent receiving social security administration benefits, and 3 percent having some form of health insurance. In particular, the poor and informal sector workers have little or no access to health insurance. Even health *mutuals* overwhelmingly serve the nonpoor.

Food insecurity plays a crucial role in household vulnerability. Household data reveal a lack of means to satisfy minimum consumption needs. According to the Senegal Demographic Health Survey/Multiple Indicator Cluster Survey for 2010–11, 27 percent of children under five suffer from chronic malnutrition (which remains highest in rural areas) and 11 percent suffer from severe malnutrition (Measure DHS 2011). In terms of self-reported difficulty obtaining food, poor households "always" or "often" have difficulty satisfying household nutrition needs. The highest rate is among the urban poor, at 32.7 percent (table 9.2).

Rural households remain highly vulnerable to changing environmental conditions. Senegal is a Sahelian country in which 60 percent of the population is engaged in agriculture, with groundnuts as the principal product. Rural regions are highly vulnerable to variations in rainfall, with rainfall shortages causing significant reductions in agricultural harvests and rural incomes and at least

Table 9.2 Percentage of Households Satisfying Food Needs over Last 12 Months in Senegal, by Location

	Nonpoor			Poor		
Frequency	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Never	42.6	27.1	36.2	18.6	18.1	18.3
Rarely	25.8	25.0	25.5	19.0	20.2	19.8
Sometimes	19.3	26.9	22.4	29.7	32.6	31.6
Often	11.1	18.3	14.1	24.2	24.1	24.1
Always	1.2	2.8	1.8	8.5	5.1	6.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Diop 2012.

5 million families exposed to drought risk. Flooding also affects several regions, compromising production and infrastructure as well as damaging and destroying household assets. The risk of drought continues to be one of the main sources of vulnerability for rural households as well as one of the biggest internal risks.

Vulnerability to Shocks

Significant exogenous shocks frequently affect the Senegalese economy, with lasting consequences for economic growth. As demonstrated in the food, fuel, and financial crises of 2008–09, external shocks strike Senegal's small, open economy particularly hard. Senegal imports all of its oil (which powers most of its electricity), and 80 and 100 percent of its rice and wheat for consumption, respectively. In 2007–08, the price of rice in local markets tripled, while the price of grain increased 50 percent; the price of other staples like sugar, wheat, and milk products rose an average of 30 percent. Increases in the price of fuels were also significant, with particularly large increases for the types of fuel on which poor households rely, like butane gas.

The macroeconomic effects of these price increases were substantial. A widening current account deficit and fiscal slippages in 2008 led to a slowdown in private growth, especially in the construction sector. Real GDP growth fell to 2.2 percent in 2009. These price increases affected businesses, both directly through increased outlays on fuel, as well as indirectly through their general inflationary effects. With Senegal's dependence on petroleum products for electricity generation, these input price hikes placed a financial strain on the national electricity company, SENELEC. Senegal's GDP growth was hindered further by frequent electricity outages, which caused a slowdown of economic and manufacturing activities. According to local reports, the outages contributed to the closure of many small and medium-size enterprises in the

food-processing, textile, and tourism sectors. Larger companies reported declines in output averaging 30 percent (U.S. Mission to Senegal 2009).

The national poverty rate rose 6 percentage points, from 51 percent in 2005/06 to 57 percent in 2008, affecting rural and urban households alike (Ivanic and Martin 2008). As a result of the sharp rise in food prices, living conditions of the poorest households deteriorated, with an increase in the level of household indebtedness and a reduction in the quality and frequency of meals—leading to more food insecurity and malnutrition (World Bank 2009).

Coping Mechanisms

Households employ a variety of coping mechanisms to address adverse economic shocks (table 9.3). Only 25 percent of households tap into their savings in response to a shock, mainly in cases of health shocks (illness or death) and business failure. Some households sell their assets, which can lock them into long-term poverty. Some rely on family support, whether from within the country or abroad. Only a few households receive aid from nongovernmental organizations or the government (2 and 1 percent, respectively).

More than half of households have no specific strategy for responding to shocks. This coping profile highlights the essential vulnerability of households. Even the few households that do have a formal coping strategy tend to rely heavily on assets and savings, which are less available to the poor.

Social Assistance Response

The last decade has shown how frequently large-scale shocks occur in the Senegalese economy and the limited range of government responses available to help households to cope. Historically, the government of Senegal has used financial support to farmers and general assistance to the poor as a direct response to droughts. A series of financial mechanisms were put in place in the late 1990s to mitigate and cope with the risks to agriculture as well as to ensure an adequate flow of credit following a drought.[1] The fiscal costs of these responses to agricultural shocks rose to 0.2 percent of GDP during this period. This type of support proved to be poorly targeted, with larger subsidies and write-offs for larger rural producers and those able to participate in the formal credit system.

More recently, in response to the triple wave of crises in 2008, the government introduced a series of fiscal measures, including subsidies on basic foodstuffs (rice, wheat, and milk), butane or natural gas, and electricity. Table 9.4 documents the magnitude of these subsidies over time. This response absorbed 2.4 percent of GDP, or one-tenth of all spending, in 2008. Additionally, the use of subsidies came with administrative difficulties and generated economic

Table 9.3 Household Responses to Reported Shocks in Senegal
% of households

Type of shock	Aid from government	Aid from a nongovernmental or community-based organization	Sale of assets	Savings	Loan	Aid from family in-country	Aid from family abroad	Aid from friends	No strategy
Death of family support	0.9	2.3	12.5	24.9	8.8	31.2	14.0	17.1	38.7
Serious illness or accident	1.2	3.4	25.9	36.3	12.5	27.7	16.4	15.8	18.9
Loss of employment	0.1	0.5	12.2	19.2	7.7	13.9	4.7	11.1	60.4
Failure of a family enterprise	0.0	0.0	26.8	30.7	27.5	1.5	0.4	6.2	36.3
Loss of harvest	0.7	0.8	7.0	6.3	7.5	5.2	2.3	2.2	77.6
Loss of livestock from a fire, flood, pests, theft	0.3	0.5	7.5	6.1	2.2	1.2	0.3	0.9	82.0
Significant loss of income (temporary layoff)	3.4	0.0	3.5	11.3	9.1	14.8	3.9	12.0	62.3
Partial or full loss of housing from fire, floods	2.1	3.0	8.3	12.5	2.9	3.7	1.7	2.7	66.4
Loss of main means of production	0.0	1.2	0.4	16.3	1.7	0.0	0.0	8.4	57.2

Source: Echevin 2012.

Table 9.4 Amount of Subsidies on Basic Goods and Utilities in Senegal, 2005–11
CFAF, billions

Indicator	2005	2006	2007	2008	2009	2011
Transfers and subsidies	165	308	287	333	286	331
Subsidies on basic consumer goods	26	152	76	145	63	139
Société Africaine de Raffinage and other producers of liquefied petroleum gas	14	66	55	69	33	15
SENELEC	12	86	0	30	30	124
Food subsidies	0	0	21	46	0	0
Total as % of GDP	0.6	3.1	1.4	2.4	1.0	2.1

Source: World Bank 2013.

disincentives, with the bulk of benefits going to the nonpoor. For example, 31 percent of households benefiting from electricity subsidies were poor and about 7 percent were in the poorest quintile. The strong majority of beneficiaries of both food and utility subsidies were urban dwellers.

The government as well as key international partners agree that the country needs to build a targeted safety net system rather than rely on general subsidies. In 2005, in analyzing the use of the agricultural security funds to respond to droughts, the International Monetary Fund concluded, "A more efficient safety net program would explicitly target poor farmers for compensation in response to a severe shock" (IMF 2005).

The social protection system has been strengthened, although progress has been insufficient to respond to the recent shocks. The National Social Protection Strategy, 2005–15 was developed in 2005 with strong support from the World Bank. Its principle objective was to adopt an integrated global vision of social protection that promotes access to risk management by vulnerable groups. The strategy foresaw the diversification and expansion of social protection instruments. It was, however, less specific on the exact nature of safety nets to be expanded, as there was little experience in the country at that time. There was little in the way of guidance on priority interventions, implementation structures, program harmonization, or institutional arrangements around safety nets. The Second Poverty Reduction Strategy Paper 2006–10, adopted by the government in mid-2006, made a strong case for strengthening Senegal's social protection system. While the second pillar of the strategy aims to promote access to basic social services by a growing share of the population, the third pillar emphasizes the need to improve the lives of vulnerable groups through targeted interventions and prescribes actions to ensure that these groups benefit from wealth creation and gain better access to social services.

A recent review of Senegal's safety net programs identified 12 programs currently under implementation by the government (table 9.5). These programs

Table 9.5 Objectives, Type of Benefit, and Geographic Distribution for Each Safety Net Program in Senegal

Program	Objective	Type of benefit	Geographic distribution
Sésame Plan	Access to health services	Fee waiver	National, all the territory
Programme de Réadaptation à Base Communautaire (PRBC): community-based readaptation program	Social integration	Grant, materials	National, all the territory
Projet d'Appui à la Promotion des Aînés (PAPA): old-age support program	Social integration	Loan	National, all the territory
Initiative de Protection Sociale des Enfants Vulnérables (IPSEV): social protection initiative for vulnerable children	Family integration	Cash	(Pilot) Kolda region, 2 cities: Coumbacara, Kolda; 35 rural and periurban communities
Programme d'Appui à la Mise en Oeuvre de la Stratégie de Réduction de la Pauvreté (PRP): poverty reduction program	Poverty reduction	Loan	3 regions: Matam, St. Louis, Louga (rural)
Nutrition Ciblée sur l'Enfant et Transferts Sociaux (NETS): pilot cash transfers for child nutrition program	Resistance to shocks	Cash	(Pilot) 6 regions (64 rural communities): Matam, Louga, Kaolack, Tambacounda, Sédhiou, Kédgougou (rural)
Bons d'Achat World Food Program (WFP CV): cash vouchers for food pilot program	Resistance to shocks	Cash	(Pilot) 2 regions (10 cities): Pikine, Ziguinchor, urban
Fond de Solidarité Nationale (FSN): national solidarity fund	Resistance to shocks	Cash, materials	National, rural and periurban
Commissariat à la Sécurité Alimentaire (CSA): food aid agency	Resistance to shocks	Food	National, all the territory
Bourses d'étude pour les orphelins et autres enfants vulnérables (OEV): educational support for vulnerable children	Access to education	Cash	National, all the territory
Programme d'Alimentation Scolaire (DCaS): national school lunch program	Access to education	Food	National, rural and periurban
Cantines Scolaires World Food Program: school lunches	Access to education	Food	All regions except St. Louis and Dakar, rural and periurban

serve a variety of objectives, including increasing school attainment, improving access to health services, maintaining children within families via the social protection initiative for vulnerable children, providing cash transfers in response to shocks, and promoting the social and economic integration of marginalized groups (such as the disabled and elderly). The majority of the programs are implemented by the Ministry of Family and the Ministry of Social Action and National Solidarity.

Despite the large number of poor and vulnerable individuals, the safety net programs in place have limited coverage. An estimated 4 million people receive some type of safety net assistance each year (table 9.6), which is

Table 9.6 Number of Safety Net Beneficiaries in Senegal, by Program and Year, 2009–11

Program	2009	2010	2011
PRBC	1,500	1,900	—
FSN	32,000	—	—
CSA	2,760,000	3,000,000	3,600,000
DCaS	700,414	761,439	780,000
Of which			
Cantines Scolaires World Food Program	567,185	565,560	596,253
NETS	2,982	21,986	26,294
PRP	1,274	1,440	700
WFP CV	n.a.	97,000	55,000
OEV	3,290	5,060	4,956
IPSEV	n.a.	n.a.	900
Total	3,501,460	3,888,825	4,467,850

Source: World Bank 2013.
Note: — = not known; n.a. = not applicable.

equivalent to a little under one-quarter of the national population. However, this grossly overestimates the number of people covered by an effective safety net. The CSA accounts for about 80 percent of these beneficiaries, and school lunches account for an additional 17 percent. *In particular, the CSA provides food aid assistance to vulnerable populations either in response to catastrophes or through the distribution of rice at public rallies and religious festivals*. Neither CSA nor school lunches screen beneficiaries based on their need. Considering only those programs that target and screen vulnerable beneficiaries, and for which data are available on the number of beneficiaries (that is, excluding the CSA and school lunches), only 100,000 people benefited last year (NETS and WFP CV).

With regard to safety net spending, the existing programs have averaged about CFAF 17 billion per year over the last three years, equivalent to 0.27 percent of GDP. Government spending can reach up to 4 percent of GDP for shock response interventions such as indirect tax cuts or subsidies. The school lunch programs account for more than 70 percent of safety net expenditures, reflecting large coverage.

In general, Senegalese safety net funding remains largely dependent on donor financing, and thus programs are fragmented and unsustainable. Out of the nine programs with funding information, donors finance 62 percent of costs, local governments account for 7 percent, the national budget accounts for 27 percent, and community contributions make up the remaining 4 percent.

In sum, Senegal has taken action to protect the poor and vulnerable in recent years; yet the scale, coverage, targeting mechanisms, targeting population, and delivery methods of these safety net programs differ. Greater coordination of programs is needed to create a coherent safety net and develop a more integrated national social protection system. A better-targeted, more efficient, and scaled-up national system of safety nets would contribute directly to poverty reduction among vulnerable populations.

Targeting Method Covered in the Case Study

Choosing the appropriate targeting mechanism is crucial in the Senegalese context, given the increasing need and constrained resources. It is necessary to concentrate limited resources on the most vulnerable populations with the aid of effective targeting mechanisms. Effective targeting mechanisms have several advantages, including reducing the errors of exclusion (eligible beneficiaries who do not benefit) and of inclusion (ineligible beneficiaries who do benefit) and promoting pro-poor public expenditures. One of the principal challenges, however, is to define target populations when half of the population is below the poverty line, and the differences between poor households are minimal.

Safety nets in Senegal use a variety of targeting mechanisms, with a predominance of categorical targeting. Categorical targeting is often reinforced by prioritizing certain geographic areas and confirmed through community-based mechanisms. However, it typically requires some further eligibility screening to ensure that the poorest and most vulnerable benefit in the end. To date, in Senegal, no proxy means test (PMT) methodology has been used to screen beneficiaries at the household level. Geographic targeting may use different poverty maps, yet none systematically identifies poorer communities below the region or *departement* level. Table 9.7 provides an overview of the targeting systems used by existing programs.

Several programs rely on geographic targeting to determine eligibility for benefits. That is, all people who live in the designated areas (particularly areas with high levels of poverty, food insecurity, malnutrition, or exposure to natural disasters) are identified as eligible and those who live elsewhere are not. In the literature on targeting, geographic targeting is used frequently as a first tool to identify areas with a high prevalence of potential beneficiaries (see Grosh et al. 2008; Coady, Grosh, and Hoddinott 2004). Geographic targeting is also employed frequently as a social assistance budgetary allocation tool, where areas with high levels of poverty receive larger budgets than other areas.

As a stand-alone tool, geographic targeting treats all individuals in a given area equally. It does not allow policy makers to disentangle the most affected or

Table 9.7 Targeting Methods, Criteria, and Source of Information in Senegal, by Program

Program	Method	Criteria	Sources
Sésame Plan: elderly health fee waiver	Categorical	Age	Identification card
PRBC: support to disabled	Categorical	Disability	Candidate dossier
PAPA: support to elderly	Categorical	Age and vulnerability	Candidate dossier
FSN: solidarity fund	Categorical	Victim of a disaster	Candidate dossier
CSA: food aid agency	Categorical	Food insecure	Candidate dossier
IPSEV: support to vulnerable families	Geographic	Vulnerable children at risk of family separation	Reports
	Categorical	Age and vulnerability	Social worker survey
OEV: HIV/AIDS vulnerable child grants	Geographic	Epidemiological situation	Epidemiological data or surveys
	Categorical	Orphans and vulnerable children	Social worker survey
DCaS: school lunches	Geographic	Rural food insecurity	Poverty surveys
	Categorical	School enrollment lists	School reports
WFP: school lunches	Geographic	Food-insecure rural areas	Poverty surveys
	Categorical	School enrollment lists	School reports
PRP: poverty reduction program	Geographic	Poverty	Local development plans
	Categorical	Women, disability, HIV/AIDS	Neighborhood reports
	Community-based	Prioritized at community level	Community information
CLM: cash transfer	Geographic	Zones with high malnutrition	Nutritional surveys
	Categorical	Vulnerable children	Reports
	Community-based	Prioritized at community level	Community information
WFP CV: food voucher	Geographic	Vulnerable areas	Poverty surveys
	Categorical	Food insecure	Reports
	Community-based	Prioritized at community level	Community information

Source: World Bank 2013.
Note: HIV-AIDS = human immunodeficiency virus/acquired immunodeficiency syndrome.

the actual affected population in an area hit by a given type of shock. Moreover, to address short-term needs, geographic targeting must be updated regularly with indicators of exposure to covariate shocks (floods or droughts). This requires a functional early warning system or community network, but also allows for more geographically refined targeting than with nationally representative survey data. Further, not all households within a shock-exposed area will be affected by a shock, and even if exposed to a shock, some households will have sufficient resources or access to coping mechanisms that help them to avoid poverty and food insecurity. Thus targeting efficiency can often be improved by combining geographic targeting mechanisms with other methods that address the circumstances of individual households.

As indicated in chapter 2 of this book and in the literature, using a combination of targeting methods within a single program can produce better targeting results than relying on a single method (Grosh et al. 2008; Coady, Grosh, and Hoddinott 2004). Combinations of geographic targeting and PMT or geographic targeting and means testing or geographic targeting and community-based targeting are generating promising results in countries like Mexico, Brazil, Kenya, Tanzania, and Niger. Unfortunately, few studies to date provide information on the actual cost of targeting methods, which is needed to analyze the costs and benefits of different methods the combinations of methods.

The current performance of these targeting systems is mixed. The 2011 *Enquête de Suivi de la Pauvreté au Sénégal* (ESPS2) included questions on coverage of a range of social programs. The programs cited include nutritional reinforcement, youth employment programs (*Office Banlieue*), agricultural development, elderly health care (Sésame Plan), food aid, educational support (scholarships), and housing assistance. Some programs were very effective at concentrating on the poorest households, like the nutritional reinforcement and agricultural support programs, while others had significant leakage to the nonpoor, including educational assistance (like scholarships) and food aid. The elderly health care program (Sésame Plan), for example, benefits the better-off 40 percent of households concentrated in urban areas.

Proxy Means Test

The PMT mechanism can guide the selection of beneficiaries based on observable poverty characteristics, which can be extracted from household survey data. The ESPS2 provides a wide range of indicators that help to explain poverty status in Senegal. Certain determinants of poverty, however, can be manipulated if households know that their answer could render them eligible for social assistance, for instance, and others are difficult to observe or verify in the field. Some characteristics, such as size and composition of the household, are more easily verifiable.

This case study looks at two PMT simulations for targeting of the Senegalese safety net programs. The PMTs are evaluated based on their predictive power in identifying poor households. Thus the implicit benchmark is perfect targeting based on current levels of household welfare as observed in the household survey. In other words, predicted household welfare from the PMT model is used to select households for targeting and to estimate inclusion and exclusion errors for the PMT as a targeting tool in Senegal.

PMT Simulation 1

Echevin (2012) provides a *simple PMT simulation*. As described above, the observable household characteristics are chosen to derive the PMT formula

through ordinary least squares regression analysis. These characteristics are the ones that can identify the poor and exclude the nonpoor most accurately. Table 9.8 illustrates the coefficients of these characteristics as well as the power of each variable to explain adult-adjusted per capita expenditure (indicated by the R^2).[2] The contribution of each variable in explaining per capita expenditures is ranked from the largest to the smallest contributor. In both urban and rural Senegalese households, having a household of 14 members or more is the biggest determinant of expenditure levels and thereby poverty.

Once the observable characteristics are chosen, a PMT instrument can be created and used by a variety of safety net programs. The coefficients of these characteristics represent weightings associated with levels of household well-being (table 9.8). By adding up the coefficients of these characteristics, we can derive a composite score of household well-being. For instance, in rural areas, a household with 14 members who get their water from a well and only have kerosene lamps would score −0.697. An identical household with access to electricity would score −0.548. In this manner, without directly measuring household consumption or even poverty level, it is possible to classify households as beneficiaries or nonbeneficiaries of a social assistance program according to their composite score.

Given that the PMT method is based on observable household characteristics, it can be adjusted in times of shock. Indeed, the impact of shocks modifies the effect of each observable characteristic of the household. PMT targeting could thus reflect events that affect household well-being.

Table 9.8 Principal Determinants of Poverty Based on Observable Household Characteristics for Rural Areas of Senegal

Characteristic	Coefficient	P-value	Cumulative R^2	Contribution to R^2
14 members or more	−0.319	0.000	0.075	0.075
Rudimentary roof	−0.213	0.000	0.131	0.057
Water from a well	−0.229	0.000	0.172	0.041
Lighting with kerosene lamps	−0.149	0.000	0.181	0.009
Children (0–5 years old) in the household	−0.147	0.000	0.187	0.006
Rudimentary lighting	−0.145	0.000	0.192	0.005
Rudimentary kitchen or cooking	−0.299	0.000	0.196	0.004
Children (6–14) in the household	−0.149	0.000	0.199	0.003
Latrines	−0.073	0.000	0.201	0.002
Piped water	−0.057	0.000	0.201	0.001
Disability	−0.051	0.002	0.202	0.000

Source: Echevin 2012.

PMT Simulation 2

A recent, more *complete PMT formula* features an improved set of variables associated with the adult-adjusted per capita expenditures of Senegalese households. This formula (illustrated in table 9A.1 in the annex to this chapter) was designed with the purpose of further reducing the existing targeting errors. These targeting errors are computed using the poorest 20 percent of households, as well as the 20 percent lowest-PMT-scoring households. The new formula was generated separately for Dakar, other urban areas, and rural areas, so as to account for the unique determinants of well-being in all three regions. As shown in the table, this formula uses a wide range of indicators to identify poor households, reflecting the multidimensional aspect of poverty: socioeconomic characteristics of the household head and members, composition of the household, characteristics of the dwelling, geographic location, and productive and nonproductive assets. The variables used depend on the formula area (Dakar, other urban, or rural): for instance, additional employment characteristics are used for Dakar and other urban areas, but agricultural production and assets are not used for Dakar.

Table 9A.1 indicates that, holding everything else equal, larger households tend to have lower scores for well-being, which is commonly found in PMT formulas. Regarding education, the divide is between household heads with or without higher education, with negative weights associated with all other categories. Indicators of housing quality (access to electricity, formal toilets, access to tap water, cement floor) are also associated with higher scores. Livestock is used to discriminate between households—in rural areas and in urban areas other than Dakar—and is associated with positive weights.

Some belongings are particularly useful for identifying wealthier households: the coefficients associated with owning a car, a truck, and a tractor, for instance, weight heavily in the formula. The region in which the household lives is also an important element of the PMT formula and is associated with some of the highest coefficients. In contrast, only a few services located within 1 kilometer of the house were included in the formula (and only in urban areas other than Dakar), indicating a low potential for nearby services to discriminate poor and nonpoor households in Senegal based on the ESPS2 data set.

Performance of Targeting Mechanisms (Two Simulations)

The simple PMT simulation compared with both actual household welfare and current program eligibility criteria reveals that there is potential to improve targeting outcomes by applying different targeting scenarios to existing safety net programs in Senegal. The simulation done by Echevin (2012) uses nine safety net programs with different targeting scenarios. The base scenario uses

the current categorical targeting based on the general characteristics of beneficiaries used in Senegal. The second scenario estimates targeting outcomes using the PMT, and the third simulation uses geographic targeting to concentrate resources in the poorest areas in the regions where programs operate, differentiated between urban and rural.

The worst targeting outcomes in terms of inclusion errors occur as a result of categorical targeting. Geographic targeting improves outcomes over the base case in all of the simulations. Using a PMT method, however, further improves targeting outcomes in almost all cases. Thus the share of benefits allocated to the poor when using the PMT method is much higher than when using geographic targeting alone. Regarding undercoverage as well, categorical targeting has the worst outcomes and PMT targeting almost always outperforms geographic targeting.

The targeting performance of the complex PMT formula was assessed by looking at the errors of exclusion and inclusion (table 9A.1). Because of the high incidence of poverty in Senegal, the more complete PMT formula was designed with the purpose of limiting the exclusion of poor households from safety net programs as well as the inclusion of nonpoor households in the same programs. The eligibility threshold used in the formula is the lowest quintile of the PMT scores, which was compared to the poorest quintile of the current household welfare distribution to compute targeting errors in the three areas (Dakar, other urban, and rural). The results indicate that errors of exclusion range from 19.7 percent in urban areas (excluding Dakar) to 33.7 percent in rural areas, and errors of inclusion are 35.6 and 44.5 percent, respectively (table 9.9). These levels of errors are common for this level of coverage (20 percent of the population) and are relatively low for Dakar and other urban areas where poor households constitute a more homogeneous group in terms of PMT characteristics. Nevertheless, the higher errors of inclusion and exclusion in rural areas—where poverty may be more diverse and harder to identify effectively—signal the need for further information to improve targeting outcomes. Moreover, the increased R^2 compared to the simple PMT formula suggests that, by including additional variables—as in the second formula—we are able to predict consumption more accurately. This makes poor households easier to identify, at the cost, however, of a longer survey with a much larger number of variables.

Table 9.9 Targeting Performance of PMT Formulas in Senegal
% of poor

Type of error	Urban areas (excluding Dakar)	Dakar	Rural areas
Inclusion	35.6	36.3	44.5
Exclusion	19.7	25.9	33.7

Conclusions

Senegal will continue to face both internal and external shocks. The scope, coverage, and effectiveness of the safety net programs (or system) will determine the resulting impact on poor and vulnerable households.

Use of the PMT mechanism can be unified across programs, with specific filters for each program. The PMT mechanism is useful for all poverty-oriented programs that target at the household level. A unified mechanism with specific filters for each program (or a specific target group) is useful across the range of targeted programs in education, health, agriculture, and other key sectors.

The government of Senegal uses a combination of targeting methods for the Programme National de Bourse de Securité Familiale (PNBSF), which aims to provide cash transfers to 250,000 Senegalese households until 2017. This program, which is considered the backbone of the future national social protection system, relies on the development of a registry of potential beneficiaries and the harmonization of targeting methods. As of today, the program combines geographic, community-based, and PMT targeting to select beneficiaries. However, to harmonize the targeting methods of other programs around the PNBSF, the government could consider the following next steps:

- Review the process of implementing the targeting methods based on more recent poverty maps, if available, and of exploring new household surveys and census
- Adapt the targeting formula to specific contexts, like natural disasters, where the impacts of short-term shocks would be incorporated, if needed, by combining geographic targeting on poverty with some shock-related indicators obtained from a shock warning system
- Develop an operational manual to transfer capacities to other institutional actors
- Implement a pilot to test the actual performance of the PMT targeting tool
- Evaluate the efficacy of targeting methods and processes for the first set of households identified for the program
- Discuss findings and results with other international actors and share documents and data to transfer capacities to other institutional actors.

A common targeting tool like the one generated for the PNBSF should be supported by other key elements of a common targeting system. The PMT data requirement and the development of a social registry of potential beneficiaries are based on a common questionnaire that can then be complemented with additional program-specific information, if needed. In addition, an institutional

framework that places one operational agency in charge of the targeting process should support the national system. This agency, the Délégation Général de la Protection Social et à la Solidarité, should be responsible for coordinating implementation of the system across the range of agencies. A clear institutional framework would improve the management of the process and provide greater stability in the social protection system in Senegal.

In summary, this chapter has found that errors of inclusion and exclusion are inherent in the PMT method but can be reduced by combining PMT (for targeting chronically poor households) with geographic targeting (that is, for identifying areas affected by the shocks). Furthermore, the establishment of a transparent selection process and verification mechanisms (including community-based mechanisms) would help to reduce the risk that beneficiaries would supply erroneous information in an attempt to claim program eligibility and therefore help to minimize inclusion and exclusion errors.

Annex 9A Detailed Results

Table 9A.1 PMT Formulas for Dakar, Other Urban Areas, and Rural Areas, Senegal

		Weight	
Variable	**Urban (other)**	**Dakar**	**Rural**
Gender of household head			
Female	88.9		28.9
Religion of household head			
Not Muslim			−203.0
Age of household head			
34 years old or less	−9.6		9.7
50 years old or more	4.9		12.4
Education of household head			
No education	−60.9		−263.0
Primary school	−38.9		−248.0
Secondary school 1	−30.0		−225.0
Secondary school 2	−54.6		−311.0
Marital status of household head			
Monogamist	42.2		64.4
Widowed or divorced	−12.5		−5.9
Polygamist	83.7		101.0

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Table 9A.1 (continued)

Variable	Urban (other)	Weight	
		Dakar	Rural
Presence of a disabled household member			
Disabled household member			–51.2
Health insurance			
Household head has a health insurance	30.0		
Agriculture			
The household has agricultural production	–337.0	51.9	
Household head practices agriculture			–39.4
Employment sector of household head			
Agriculture		0.0	–85.8
Fishing or forestry		–372.0	58.2
Industry		–167.0	–30.8
Trade		–170.0	15.6
Services		–179.0	–13.2
Socioeconomic position of household head			
Manager	0.0	0.0	
Qualified worker	–58.6	87.3	
Semiqualified worker	–44.1	0	
Unskilled worker	–82.3	0	
Independent	–106.0	0	
Family help or trainee	–56.4	0	
Other	–122.0	–144.0	
Inactivity		–119.0	–66.8
Independent member			
One member of the household (at least) is an independent worker	46.5		
Wage earner of household head			
Permanent wage earner	106.0	76.6	
Temporary wage earner	–22.3	139.0	
Employment sector of household head			
Public sector	27.6	33.5	–79.3
Private sector (large firm)	136.0	102.0	154.0
Microenterprise	121.0	80.1	5.79
Other household	30.8	–97.3	25.3

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Table 9A.1 (continued)

Variable	Urban (other)	Weight	
		Dakar	Rural
Household size			
Number of people in the household	−125.0	−115.0	
Number of people in the household squared	1.92	2.56	
1 person			694.0
2–3 people			235.0
4–5 people			95.4
7–9 people			−137.0
10 people or more			−207.0
Household composition (number of members)			
5 years old or less	52.1		−28.5
6 to 14 years old	43.5		−18.4
15 to 24 years old	−6.2		−63.3
25 to 64 years old	0.0		−57.1
65 years old or more	−22.7		−56.8
Student			
Household head is enrolled in school		481.0	139.0
Rooms in house			
Two rooms	−27.5	−113.0	116.0
Three rooms	−71.5	−267.0	60.5
Four rooms	−67.4	−287.0	109.0
Five rooms	−67.1	−375.0	86.5
Six rooms	−52.3	−552.0	120.0
Seven rooms or more	−12.4	−625.0	180.0
Number of rooms			
Number of rooms in the house		77.9	
Household members per room			
Number of household members per number of rooms	−38.2	−57.0	
Source of lighting			
Electricity	87.8	72.7	47.2
Lamp (gas, oil)	15.8	0.0	19.9
Other	0.0	0.0	0.0
Bathroom facility			
Formal toilet (with flush)	140.0		71.2
Latrines	80.4		34.4

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Table 9A.1 (continued)

Variable	Urban (other)	Weight	
		Dakar	Rural
Source of drinking water			
Tap	128.0	316.0	39.3
Well	32.6	0.0	−22.8
Drilling	57.3	0.0	162.0
Other	113.0	0.0	0.0
River	119.0	0.0	184.0
Source of energy for cooking			
Electricity or oil	0.0	0.0	0.0
Coal	42.6	−106.0	58.2
Wood	16.8	−199.0	14.7
Natural gas	86.8	−146.0	226.0
Other (garbage, no cooking)	−5.5	−182.0	−123.0
Roof material			
Solid (cement, zinc)			35.4
Floor material			
Solid (cement, tiles)		667.0	54.8
Wall material			
Solid (cement bricks)	31.5		
Garbage service			
Garbage taken away by a garbage service	42.3	54.6	
Internet			
The household has Internet access	16.4		
Type of residence			
Formal residence		52.4	
Kitchen			
Separate room for the kitchen	92.0	88.3	
Type of dwelling			
House with several floors or apartment in a building	0.0	0.0	
Low house	−90.0	−38.8	
Hut or other	−94.4	−107.0	

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Table 9A.1 (continued)

Variable	Urban (other)	Weight	
		Dakar	Rural
Household ownership of this type of animal (several possible)			
Cow(s)			98.9
Goat(s)			14.1
Sheep(s)			31.1
Pig(s)			35.6
Horse(s)			51.3
Poultry			−22.8
Number of animals owned (several possible)			
Cows	4.2		
Goat(s)	1.5		
Sheep(s)	0.0		
Pig(s)	1.4		
Horse(s)	50.4		
Poultry birds	0.5		
Household owns donkey(s)	12.5		
Land			
Household owns agricultural land	312.0		
Cash crops			
Household grows cash crops	128.0		
Fertilizer			
Household uses fertilizer	13.0		
Hired labor			
Household hires labor	−41.8		
Services within 1 kilometer (several possible)			
Primary school	28.4		
Telecenter	14.3		
Internet café	32.2		
Police station	30.6		
Ziguinchor	−346.0		−605.0
Diourbel	0.0		−399.0
Saint-Louis	−101.0		−185.0
Tambacounda	−191.0		−305.0
Kaolack	142.0		−508.0

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Table 9A.1 (continued)

Variable	Urban (other)	Weight	
		Dakar	Rural
Thiès	−121.0		−206.0
Louga	−27.2		−243.0
Fatick	−304.0		−438.0
Kolda	−230.0		−439.0
Matam	−50.9		−131.0
Kaffrine	−160.0		−232.0
Kédougou	−103.0		−646.0
Sédhiou	−101.0		−275.0
Household ownership of this type of asset			
Radio	4.3	77.7	41.7
Television	23.1	136.0	22.3
Cable or private network television			85.2
Bicycle			40.4
Motorcycle	47.0		166.0
Cart	−35.4		10.3
Air conditioner	21.0		54.8
Fan	89.4	80.6	85.7
"*Eponge*" mattress	35.1		51.5
"Spring" mattress	38.7	115.0	
Table	17.3		35.6
Chair		63.1	36.1
Bed	97.7		
Carpet		57.3	20.2
Rug			52.1
Clock or alarm clock	9.3	49.1	12.0
Phone (landline)	77.3	68.0	
Phone (mobile)	93.5		
Phone (landline or mobile)			100.0
Computer	71.8	48.1	55.3
Multimedia player	27.7		
Satellite dish	25.8	62.5	76.5
"*Onduleur*"	25.0		
Flatiron	70.5	196.0	96.6
Modern stove	42.9	44.1	
"*Malgache*" oven	18.2	53.8	84.9
Improved oven	45.1		137.0

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Table 9A.1 (continued)

		Weight	
Variable	**Urban (other)**	**Dakar**	**Rural**
Sewing machine	26.0		
Water heater			174.0
Food processor, mixer			441.0
Fridge or freezer	96.2	47.2	30.0
Natural gas bottle	61.2	21.1	76.1
Electric generator	34.1		
Flashlight	28.8		36.5
Solar panel	202.0		
Car	191.0	112.0	221.0
Truck	239.0	108.0	878.0
Tractor	304.0		
Pirogue	147.0		131.0
Wardrobe	34.4	8.99	2.65
Library	43.4	16.7	17.8
Trunk	13.8		
Armchair			96.2
Plow	20.2		
Pilling machine ("*decortiqueuse*")	63.8		
Net "*a tourner*"	13.7		28.7
Wheelbarrow	24.2		93.8
Seed drill	38.2		
Spray equipment	27.7		66.9
Water barrel	17.3		46.3
Water reservoir			150.0
Hoe ax	−23.5		
Other equipment	53.9	77.1	43.2
Living room	77.1	69.2	42.2
Sleeping room	67.6	125.0	
Constant	12,880	12,730	12,720
Number of observations	2,379	508	2,740
R^2	0.739	0.786	0.653
Errors (%)			
Exclusion	19.7	25.9	33.7
Inclusion	35.6	36.3	44.5

Source: Calculations based on ESPS2 data set.
Note: PMT weights for Dakar, other urban areas, and rural areas. Inclusion and exclusion errors are based on the poorest 20 percent of the population (in each area) and lowest 20 percent of PMT scores (that is, PMT-eligible households). Errors are calculated at the individual levels using ESPS2 weight coefficients.

Notes

1. The agricultural security funds are composed of three funds. (a) The *Fonds de Bonification* was created to improve the access of rural producers to credit by reducing financing charges. It finances the difference between the interest charged by commercial banks and the government-capped interest rate for loans to farmers (7.5 percent). The government pays the spread to the national agricultural bank, the Caisse Nationale du Crédit Agricole du Senegal (CNCAS), which has been operating since 1984 and is the largest source of rural finance. (b) The *Fonds de Garantie* reimburses delinquent loans to the CNCAS up to 75 percent for agriculture and 50 percent for livestock. (c) The *Fonds de Calamité* helps rural producers to cope with natural disasters, allowing them to repay loans and continue their agricultural activities, either by restoring their creditworthiness with the CNCAS or by financing supplies necessary to respond to a shock.
2. Children between 0 and 14 years of age are given a weight of 0.5, and all other household members are given a weight of 1.

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