

Food Stamp Benefit Formula

Program Rules

To be eligible for food stamp benefits, a household must have few countable assets and low monthly cash income.³ The asset limit is \$2,000 for households that do not contain an elderly member and \$3,000 for households that do. The gross income test, which applies only to households without an elderly or disabled member, requires that monthly cash income (including labor market earnings, all cash program benefits, and any other cash income) may not exceed 130 percent of the official poverty guideline. The net income test, for all households, requires that monthly cash income after certain deductions (described below) may not exceed 100 percent of the official poverty guideline (hereafter, all income and benefit variables are reported on a monthly basis, unless otherwise noted). Other eligibility restrictions apply to immigrants, students, strikers, and able-bodied adults without dependents (see Castner and Rosso, 2000, or USDA, Food and Nutrition Service, 2000, for more details).

Six types of deductions from gross cash income are used in computing monthly net income:

- D1—standard deduction (\$134 per food stamp unit, in the contiguous United States in fiscal year 1998).
- D2—an earned income deduction (20 percent of the combined monthly labor market earnings of household members).
- D3—a dependent care deduction (certain expenses for care of children or other dependents while other household members work, seek employment, or go to school).
- D4—a medical deduction (nonreimbursed medical expenses for elderly or disabled members of the household, beyond the first \$35 per month).
- D5—a child support payment deduction (legally obligated child support payments to somebody who is not a member of the household).
- D6—an excess shelter expense deduction (monthly shelter costs that exceed 50 percent of the monthly

³Not all assets count toward the asset limit for food stamp eligibility. For example, a primary residence and some assets in the form of an automobile may be excluded for this purpose.

income remaining after all other deductions are subtracted from gross income). This deduction has a cap equal to \$250 in 1998, which only applies to households without an elderly or disabled member. Because the excess shelter expense deduction depends on the income left after the preceding five deductions, it must be computed after the others.

Net income equals gross income minus deductions. Net income may not be reduced below zero, so in cases where the value of all deductions exceeds gross cash income, some potential deductions remain unused—they have no impact on the computation of net income.⁴

Net income plays a central role in determining the benefit amount. Any household with net income of zero receives the maximum benefit level, which is based on the Thrifty Food Plan and which varies according to household size. Households with positive net income receive the maximum benefit minus 30 percent of net income. For units with one or two members, a minimum benefit of \$10 is provided.⁵

A Mathematical Statement of Program Rules

To state these rules mathematically for purposes of computing benefits correctly, it is most intuitive to begin by computing deductions and net income, and then to compute benefits. Let B be benefits; let M be the maximum benefit for a household with a certain number of members; let G be gross income; let D1-D6 be the six deductions defined above; let H (for housing) be the total shelter expenses; let H* be the cap on the shelter deduction; let N1 be an intermediate net income value based on all deductions except the shelter deduction;⁶ and let N2 be the final net income.

First, intermediate net income is defined as gross income minus the first five deductions (unless this dif-

⁴For readers who are familiar with deductions mainly in an income tax context, it may be surprising that gross income minus deductions may ever be equal to or less than zero. Recall, however, that some deductions (such as the standard deduction) do not depend on a particular income source. Thus, any food stamp unit with gross income less than \$134 will have net income equal to zero.

⁵For practical purposes, the minimum benefit would not be binding for larger households in any case. In our 1998 sample, just 0.14 percent of food stamp units with more than two members had benefits less than \$10. In the empirical computations, we drop this very small group of observations.

⁶Because there is no cap on the shelter deduction for households with an elderly or disabled member, H* is set to equal H for these households. This is just a mathematical convenience, indicating that there is no cap limiting the deduction for these households.

ference yields a negative number, in which case intermediate net income is simply zero):

$$(1) N1 = \text{Max} [G - (D1 + D2 + D3 + D4 + D5), 0].$$

Second, the shelter deduction equals any shelter expenses that exceed 50 percent of intermediate net income ($H - 0.5 * N1$). The minimum shelter deduction is zero, and the deduction is capped at H^* :

$$(2) D6 = \text{Min} [H^*, \text{Max} (H - 0.5 * N1, 0)].$$

Third, final net income equals gross income minus all six deductions (unless this difference yields a negative number, in which case net income is simply zero):

$$(3) N2 = \text{Max} [G - (D1 + D2 + D3 + D4 + D5 + D6), 0].$$

Fourth, food stamp benefits equal the maximum benefit minus 30 percent of net income (with a minimum benefit level of \$10): ⁷

$$(4) B = \text{Max} [M - 0.3 * N2, 10].$$

A New Decomposition of Food Stamp Benefits

While the approach above is sensible for benefit computation, it is less useful for measuring and comparing the contribution of each component of the benefit formula toward the final benefit amount. For this purpose, it helps to restate the benefit amount as a simple sum of several component effects (table 2).

⁷Once again, to spare the reader some additional notation, we ignore the trivial number of units with more than two persons who receive less than \$10.

Table 2—Components and subcomponents of total food stamp benefits

Symbol	Component name	Description (positive or negative sign)	Formula
M	Maximum benefit	Maximum food stamp benefit, depending on household size (+)	M
E1	Income effect	Effect of gross cash income on benefits, all else equal (-)	$-0.3 * G$
E2	Deductions effect	Effect of deductions on benefits, all else equal (+)	$0.3 * D$
E3	Maximum benefit effect	Effect of receiving the maximum benefit instead of $M + E1 + E2$ (-)	$0.3 * \text{Max}[0, D - G]$
E4	Minimum benefit effect	Effect of receiving the minimum benefit instead of $M + E1 + E2$ (+)	$\text{Max}[0, 10 - (M - 0.3 * N2)]$
E2.1	Standard deduction effect	Effect of standard deduction on benefits, all else equal (+)	$0.3 * D1$
E2.2	Earned income deduction effect	Effect of labor market income on benefits, all else equal (+)	$0.3 * D2$
E2.3	Dependent care deduction effect	Effect of dependent care deduction on benefits, all else equal (+)	$0.3 * D3$
E2.4	Medical deduction effect	Effect of medical deduction on benefits, all else equal (+)	$0.3 * D4$
E2.5	Child support payment deduction effect	Effect of child support payments deduction, all else equal (+)	$0.3 * D5$
E2.6	Shelter deduction effect	Effect of the shelter deduction on benefits, all else equal (+)	$0.3 * D6$
E2.6.1	Raw shelter expense effect	Effect of gross shelter expenses on benefits, all else equal (+)	$0.3 * H$
E2.6.2	Half-income rule effect	Effect of disqualifying half of intermediate net income (-)	$-0.3 * \text{Min}[0.5 * N1, H]$
E2.6.3	Shelter deduction cap effect	Effect of the rule that shelter deduction may not exceed \$250 (-)	$\text{Min}[0.3 * H^* - (E2.6.1 + E2.6.2), 0]$

Notes: M is the maximum benefit, G is gross cash income, D is total deductions, N1 is intermediate net income, N2 is final net income, D1 is the standard deduction, D2 is the earned income deduction, D3 is the dependent care deduction, D4 is the medical deduction, D5 is the child support payment deduction, D6 is the shelter deduction, H is gross shelter expenses, and H^* is the cap on the shelter deduction. "All else equal" means holding constant all other components or subcomponents.

In overview, food stamp benefits may be expressed as the sum of the maximum benefit (M) plus four component effects—the income effect (E1), the deductions effect (E2), the maximum benefit effect (E3), and the minimum benefit effect (E4). These main effects are defined below and reported in the top third of [table 2](#) and subsequent tables.

For some purposes, it is useful to analyze the deductions effect in greater detail. A further decomposition of the deductions effect is defined later in this report and detailed in the middle and bottom thirds of [table 2](#) and subsequent tables. Readers who are interested only in the main component effects may focus on just the top third of each table of results.

The income effect (E1) is -0.3 (derived from the official benefit reduction rate of 30 percent) times gross income. If there were no deductions and no minimum benefit, food stamp benefits would simply equal the maximum benefit plus the income effect.

$$(5) E1 = -0.3 * G.$$

The deductions effect (E2) is 0.3 times total deductions. Except for unused deductions, as noted below, every dollar of deductions causes food stamp benefits to rise by 30 cents.

$$(6) E2 = 0.3 * (D1 + D2 + D3 + D4 + D5 + D6).$$

The maximum benefit effect (E3) is the effect of the fact that food stamp benefits may not exceed a maximum amount. If a household with sufficient deductions were permitted to have a net income value (N2) below zero—in essence, if it could use its unused deductions—then, according to equation (4), the household would have food stamp benefits that exceed the so-called maximum benefit (M).⁸ The maximum benefit effect represents the consequences of being unable to have benefits greater than the maximum benefit. This effect is negative for those households whose potential deductions exceed their gross income, and is zero otherwise.

$$(7) E3 = -0.3 * \text{Max} [0, (D1 + D2 + D3 + D4 + D5 + D6) - G].$$

While the maximum benefit effect is a nonpositive number, this mathematical representation does not

mean the effect should be interpreted as a penalty in a policy sense. Recall that the maximum benefit suffices to purchase the bundle of foods described in the Thrifty Food Plan. In this sense, the restriction that benefits may not exceed the maximum benefit is a purposeful policy choice, not a penalty on units with unused deductions.

Finally, the minimum benefit effect (E4) represents the effect of the minimum benefit rule on the benefit amount. This effect is positive for those one- and two-person units that would otherwise have received a benefit amount smaller than \$10, and is zero for all others.

$$(8) E4 = \text{Max} [0, 10 - (M - 0.3 * N2)].$$

The benefit formula in equation (4) may be restated as a simple sum of the maximum benefit plus the four component effects.

$$(9) B = M + E1 + E2 + E3 + E4.$$

The proof is presented in Appendix A.

More Detail on the Deductions Effect

Deductions are a critical factor in determining the amount of benefits received. Total deductions (including unused deductions) are the simple sum of the six possible deductions, D1 through D6. Likewise, the deductions effect (E2), defined in equation (6) above, is the simple sum of six effects, E2.1 through E2.6, where each effect equals 0.3 times the corresponding deduction.

The excess shelter expense deduction (D6) is especially complex and important in terms of its effect on benefits. We decompose the shelter deduction effect into three subcomponent effects.

The raw shelter expense effect (E2.6.1) represents the impact that shelter expenses would have on benefits if all shelter expenses were deductible.⁹

$$(10) E2.6.1 = 0.3 * H.$$

The half-income rule effect (E2.6.2) represents the effect of the rule that only shelter expenses above 50 percent of intermediate net income count towards the shelter deduction. If intermediate net income is suffi-

⁸For this reason, the maximum benefit effect might alternatively have been called the unused deductions effect.

⁹This is not a purely hypothetical case because 11 percent of households have zero intermediate net income (N1), so for them, all shelter expenses are deductible (up to the cap).

ciently high, then this effect completely offsets the raw shelter expense effect.

$$(11) E2.6.2 = -0.3 * \text{Min} [0.5 * N1, H].$$

Finally, the shelter deduction cap effect (E2.6.3) reflects the impact on food stamp benefits of the cap to the shelter deduction. This effect is negative for households that would otherwise be eligible for a deduction that exceeds the cap, and is zero otherwise.

$$(12) E2.6.3 = \text{Min} [0.3 * H^* - (E2.6.1 + E2.6.2), 0].$$

The shelter deduction effect (E2.6) is the simple sum of these three subcomponent effects:

$$(13) E2.6 = 0.3 * D6 = E2.6.1 + E2.6.2 + E2.6.3.$$

The proof is presented in Appendix A.