# IDENTIFYING THE URBAN POOR:

## Characteristics of Poverty Households in Bogotá, Medellín, and Lima*

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OBJECTIVES

During the last few years, interest in overall economic growth as the best measure and object of development has increasingly given way to a preoccupation with the distribution of income and thus with how the benefits of economic growth are shared.[1] Within this general concern is a specific preoccupation with the poorest families in less-developed countries, who may remain in dire poverty despite significant increases in income per head or other measures of development.

The first step in approaching this question is to identify "the poor," to define which families are in poverty and how they are to be distinguished from the nonpoor. "Finding the poor" means finding proxies or indicators for poverty, characteristics that are (1) relatively easy to establish or measure, (2) accurate in discriminating between the poor and the nonpoor, and (3) relevant to the design or evaluation of public policies. An ideal proxy will divide households into groups such that the groups are easily identified and can be reached by public action, and such that there are large differences in welfare among groups but only small differences within groups.[2]

The research reported here does not attempt to evaluate specific policies. Neither does it intend simply to characterize the poor. We try instead to find the

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poor by seeing how well they can be identified by a series of characteristics expected a priori to be associated with poverty. The characteristics examined can all be obtained through household surveys, which allow direct measures of income (or other financial measures of welfare) to be compared to various proxies for poverty. The latter are often features that can be known from other, less detailed and less expensive, sources of information.

In what follows, we address three kinds of questions. The first is how to define poverty: what measure to use, and what size group to consider. Part 1 presents several different concepts of poverty and explains how consumption expenditure per person was selected as the best simple indicator. Part 2 deals with the second question of how poverty is related to the receipt of income by the family: specifically, whether poverty is associated with particular kinds or sources of income, and how labor income—the most important source—is related to labor force participation. The final question is how well the poor can be distinguished from the nonpoor by information about proxy characteristics *other* than income or expenditure; part 3 is devoted to this question.

It should be stressed that we are not trying to identify the *causes* of poverty, because a particular characteristic may be used to locate poor families even if it is not a cause of their poverty. Thus the various indicators examined may act to explain poverty, or they may equally well be its visible consequences.

The data used in this explanatory study come from the ECIEL household budget surveys undertaken in 1967–68 in Bogotá and Medellín, Colombia, and in 1968–69 in Lima, Peru. These surveys are described in detail in publications of the institutes which collected the data and shared in their analysis.[3] Sample size is just under 800 in each of the Colombian cities and 1,357 in Lima; interviews were distributed throughout a year to capture seasonal variation. The ECIEL household data have already been used to study a number of features of the urban income distribution. Most of the results dealing with income composition and the family characteristics associated with different income levels have been summarized in the ECIEL consumption study.[4] A separate investigation summarizes all the results obtained so far on mean incomes and on the concentration of income in different cells of the population defined by one or more of the same set of family characteristics.[5]

In addition to these studies, much use has been made of the data to examine how spending on different categories varies with income (or total consumption) and with a variety of household characteristics.[6] We will refer to the results of these studies in discussing how to define and measure poverty and in evaluating several proxies of poverty. We will also use several studies based at least partly on these data and more directly related to income distribution.[7] Although nearly all this research refers also to one or more cities in other countries, the results of the present investigation refer only to Bogotá, Medellín, and Lima. The distinguishing features of the new results are their use of a per capita measure of poverty (all previous work is based on total household income or consumption) and their concentration on poor families, without any discrimination among the richest 60 to 75 percent of the population.

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## 1. DEFINITIONS AND MEASURES OF POVERTY

Here we consider how best to define poverty by a monetary measure, and then select one measure as most suitable. We also consider how closely this measure is related to some other monetary measures that may be useful proxies for it.

### An Ideal Poverty Measure

Ideally, in deciding whether to classify a household as poor or not, we should like to take account of at least four factors: some measure of current resources (Z); the level of spending or consumption corresponding to subsistence needs (Z*); a measure of household size (N); and the possible existence of economies of scale, represented by a parameter (S). In the simplest case, S is constant, but it could also be regarded as a function of N and of Z. The household's discretionary or extra-subsistence resources would then be $Z - Z^*$ in total or $(Z - Z^*)/N$ per person. Welfare or utility might be considered to be related to $(Z - Z^*)/N^S$, where $S < 1$ if there are significant economies of scale. The questions that then arise are: (1) Is it necessary or desirable to take account of N, or would a total measure suffice? If N is to be included, how should it be defined? (2) Are scale effects important enough, and easy enough to measure, to include? (3) Can Z* be measured satisfactorily? This might be based on food needs alone, or on other needs as well; and, (4) What is the best measure of Z?

Previous research using the ECIEL data gives answers to several of these questions, which while not entirely satisfactory will serve as approximations. First, it is extremely difficult to estimate subsistence spending Z* from observed family spending. The estimates differ notably in real terms among cities or countries, and even among socioeconomic strata in one city. Better estimates of Z* might in principle be obtained from exogenous information, but in practice this will be limited to the cost of a minimum or subsistence diet. One set of such estimates has been made for Colombia, allowing for differing needs of different kinds of household members, and another set, with a finer discrimination among members, for Colombia and several other Latin American countries.[8] These estimates are much more reasonable than those obtained from observed expenditures, but there are still substantial differences between the two sets of estimates for Colombia. Z* could be defined as an arbitrary multiple of the minimum food budget, but it is not possible to take account of other categories of basic needs except by setting arbitrary standards for housing, clothing, etc.[9] For simplicity, we haven chose to ignore Z* and consider only $Z/N^S$; this means that instead of looking for absolute levels of poverty, we will regard a family as poor if it is below some level in the distribution of the poverty measure. This means of course that families that are equally relatively poor in different countries need not be at the same level of absolute poverty, unless the distribution of income is very similar in the two cities.

Second, economies of scale are difficult to measure, since they vary by class of expenditure, and therefore by household composition and also by income level. These problems arise even for categories, such as food and housing,

presumably consumed by all members of the household. For expenditures directed to particular members, such as education, there may be spurious scale effects reflecting the fact that not all eligible members actually consume that good or service. Attempts have been made to detect economies of scale in Bogotá by estimating subsistence expenditures by category for families of different sizes, and seeing whether the addition of one more member to the household increases these expenditures by a constant amount (independent of family size). Declining increments are evidence of economies of scale. Over the range from three to eleven members the estimates for food and beverages alone give a value for S of about 0.94.[10] Estimates for total subsistence spending over the same household size range give a value of about 0.90 for S. These values are so close to 1.0, and the estimates are in any case sufficiently doubtful—for example, they take no account of household composition—that we have chosen to ignore scale effects here altogether.

Third, household size N might ideally be measured in adult-equivalent units, to take account of differences among households in number of adults, adolescents, and children. Such unit-consumer scales can be defined; but because they differ by expenditure category they necessarily differ with the level of income, unless the equivalence is defined only for subsistence spending and expenditure beyond subsistence is independent of family composition. The available estimates of this sort refer only to $Z^*$, which we have decided not to consider, rather than to equivalent N at all levels of all income $Z$. Moreover, children's apparent needs are a large fraction of adult needs. We chose therefore to represent N simply by the number of members of all ages in the household.[11]

It remains to consider how $Z$ should be defined and measured. In selecting an appropriate variable, we want to treat two possible problems. One is the existence of measurement errors in the data, which may be particularly troublesome for income reports. The other is the fact that for families at the low end of the scale, incomes can be highly variable so that current income may not be an adequate representation of the true (or normal or permanent) income of the family.

These shortcomings, plus an interest in ascertaining how much different definitions of poverty coincide, have led us to compare how families are classified in the income distribution by a number of alternative measures:

1. A total measure versus a per capita measure. Here the main question is whether it is necessary to take account of N at all. How do the two measures overlap, and how different are the nonoverlapping parts of the distributions?

2. A current measure versus a more permanent measure.[12] Here the question is whether a permanent variable can be estimated closely enough to obtain the conceptual advantages of such a variable.

3. An income measure versus a consumption measure of well-being. While income is the traditional measure, consumption expenditures have the advantage of being potentially a more stable indicator of family living standards and are also generally more reliable.

4. Use of type of income as a measure of well-being. Certain types of income are more unstable than others, so that perhaps concentration on those

sources that are more stable (wage income from a regular job, transfer income) may provide a better measure.

## Total Versus Per Capita Measures

Now we consider whether N need be included at all in our poverty measure. There are two possible justifications for its inclusion. The first is that N and Z may be strongly and positively correlated, so that Z/N is much more nearly equal among households than Z. In that case the use of Z alone will exaggerate the extent of inequality. The second is that even if Z and Z/N have comparable concentrations overall, they did not identify the *same* families as being poor.

Analysis of the data for Bogotá, Medellín, and Lima shows that there is only a slight positive association between N and household income Y (used as a measure of Z), and then only up to the third quartile in the Colombian cities.[13] Y/N is just about as concentrated as Y, and has in fact almost exactly the same shape of cumulative distribution. It is not necessary to take account of household size in order to remove spurious inequality of incomes.

It does matter, however, which measure is used in determining which families are poor. Let P(Z) be the percentage of households that is included in a certain percentile range of the distribution of Z, and let P(Z/N) be the share of households that simultaneously fall into the *same* percentile range of the distribution of Z/N. Then P(Z/N)/P(Z) measures the overlap of the two distributions. Table 1 shows this statistic for the three cities, with Z = C, total household expenditure, and in the case of Lima, also with Z = Y, total income, for a number of different ranges of the variables' distributions. If we consider the poorest 40 percent of households to constitute the group in poverty, between two-thirds and four-fifths of all households identified as poor by one measure (Z) are also identified as poor by the other measure (Z/N). In the poorest decile alone, the agreement is much lower. Moreover, the likelihood that a household somewhere in the poorest 40 percent is assigned to the *same* decile by both measures is only about one-fourth to one-third. We conclude that per capita measures are superior, except for very large groups of the population where the overlap necessarily approaches 100 percent.[14] So long as Z is obtained from a household survey, there is no reason not to divide it by N; difficulties arise only when Z is estimated from some other sources (workplace surveys, tax or administrative records, etc.) and N is unknown.

These measures of agreement between total and per capita indicators consider all households together. Their compatibility may be appreciably different if families are first classified by some other variable. This is most obvious if the classifying feature is itself family size: then Z tends to identify small families as poor, while Z/N will classify large households as poor. Table 2 shows the mean family size, in each city, in the poorest decile and in the poorest four deciles together, for the four variables Y, Y/N, C, and C/N, where Y is income and C is expenditure. There is usually no significant difference between N in the bottom 10 percent and in the bottom 40 percent for a given variable, nor are there great differences according to whether C or Y is used. However, N is

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TABLE 1 *Overlap of Distributions of Total and Per Capita Poverty Measures*

| Income Measure | Bogotá C | Medellín C | Lima C | Y |
|---|---|---|---|---|
| Range | | | | |
| Lowest 4 deciles | 0.71 | 0.67 | 0.74 | 0.80 |
| 1st decile | 0.44 | 0.47 | 0.49 | 0.61 |
| 2nd decile | 0.17 | 0.15 | 0.17 | 0.31 |
| 3rd decile | 0.21 | 0.15 | 0.24 | 0.17 |
| 4th decile | 0.13 | 0.15 | 0.18 | 0.21 |
| Diagonal of lowest 4th deciles* | 0.24 | 0.23 | 0.27 | 0.33 |

*Of the 40 percent falling in the bottom four deciles of the distribution of $Z$, this is the share that falls in the diagonal cells, or simultaneously in the *same* decile of $Z$ and $Z/N$.

invariably much larger when the poor are defined in per capita terms than when no adjustment is made for size.

### Income, Consumption, or Permanent Income

Finally, we consider which measure of $Z$ to use: measured income Y, measured consumption C, or estimated permanent income $Y_p$.[15] The last is clearly the best measure in principle, since it removes transitory or random variation. The difficulty is that $Y_p$ cannot be estimated precisely. We have used a technique that estimates permanent income as a function of observable characteristics. We find that 47.5 percent of the variation in $Y_p$ is explained by these characteristics for Lima, and 49.1 percent in Colombia (Bogotá and Medellín, plus Barranquilla and Cali). These statistics are satisfactorily high, if the object is to understand the determinants of permanent income; they are rather low, however, if the intent is to estimate closely the permanent incomes of individual households, particularly at poverty levels.[16]

TABLE 2 *Mean Family Size of Poor Households, by Total and Per Capita Measures of Income and Consumption (standard error of estimate of the mean never exceeds 0.4)*

| Welfare Variable | Bogotá 1 | Bogotá 1–4 | Medellín 1 | Medellín 1–4 | Lima 1 | Lima 1–4 |
|---|---|---|---|---|---|---|
| Y | 4.83 | 5.75 | 5.09 | 5.88 | 5.77 | 6.05 |
| Y/N | 7.96 | 7.26 | 8.37 | 8.37 | 7.69 | 7.38 |
| C | 4.10 | 5.56 | 4.96 | 5.87 | 5.22 | 5.92 |
| C/N | 8.08 | 7.17 | 8.75 | 8.40 | 8.59 | 7.57 |

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Shares like those in table 1 can be computed to show the overlap among Y, C, and $Y_p$, all in per capita terms, for Lima (see table 3). The generally low overlap could be due mostly to transitory variation, in which case $Y_p/N$ is the preferred measure, or it could be due mostly to estimating error, in which case $C/N$ or $Y/N$ is as good as $Y_p/N$. We conclude that while $Y_p/N$ will be a preferable poverty indicator whenever it can be estimated with high enough accuracy, the objectives of the present exploration do not justify investing a great deal of effort in refining the measure.

*TABLE 3*

|  | $P(Y/N)P(Y_p/N)$ | $P(C/N)/P(Y_p/N)$ |
|---|---|---|
| *Lowest 4 deciles* | *0.73* | *0.71* |
| 1st | 0.27 | 0.41 |
| 2nd | 0.24 | 0.18 |
| 3rd | 0.15 | 0.08 |
| 4th | 0.12 | 0.11 |
| Diagonal | 0.20 | 0.20 |

As between C and Y, the two observed variables, there are two points to consider: which is estimated or reported more accurately by the household, and which contains more transitory or random variation? It is generally expected that a budget survey will yield better estimates of C, at least as long as the entire budget is studied and the periods of reference for the different elements are comparable, and there is no reason to think the ECIEL data differ in this respect. As for the transitory variation, the estimation indicates that this is more important, as a share of total variation, for income than it is for consumption, at least in Lima. This suggests that C is slightly preferable to Y as a welfare measure. We therefore use $C/N$ as our principal poverty indicator hereafter. However, when household income and size are known but expenditures are not, $Y/N$ may be used in the expectation that it will classify families in much the same way that $C/N$ would classify them, especially among the poor.

## 2. INCOME SOURCES, DEPENDENCY BURDENS, AND POVERTY

Although consumption per person is our preferred measure of poverty, the economy does not function so as to provide consumption separately to each member of the household. The level and distribution of consumption are determined by the family, on the basis of the incomes received by one or more of its members. We therefore analyze the different sources of income households receive and the importance of family composition in terms of recipients and dependents. Six income sources are distinguished: wages and salaries, income from independent employment, receipts from capital, transfers (public or private), transitory receipts such as inheritances or lottery winnings, and unclassified income. The first two sources together are called labor income, although the income from self-employment may include some return to the capital used in an

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independent business or profession. There is not much reason a priori to expect poverty to be associated strongly with the receipt of particular *kinds* of income, but there may be exceptions. It is of interest, for example, whether the distinction between labor and nonlabor income is important for separating poor and nonpoor families; and it may be that the receipt of transfer income is concentrated among the poor.[17]

*Concentration by Income Type*

The distribution of Y/N shows a kink where the concentration or inequality suddenly increases, at about the 50th percentile in Medellín and Lima and the 70th percentile in Bogotá. ("Inequality" is usually considered a property of the entire distribution, but it can equally well be treated as a local property measurable over some part of the distribution—for example, as the ratio of incomes at points one decile apart. One part of the overall distribution can then be seen to be more or less equal than another.) This kink might be due to the receipt of capital income (other than imputed rent) at high incomes. We therefore analyzed the distribution of income per capita excluding such receipts. Although this kind of income is very highly concentrated, with essentially none being received by the poorest 80 percent of households, its removal makes very little difference to the distribution. We next separated total labor income per person (wages and salaries and also income from independent employment, some of the latter being attributable to ownership of capital in a family business), capital income per head, and transfers per person, and examined their distributions.

These analyses indicate clearly that labor income is about as concentrated, among those households who receive it, as total income. Roughly one-fifth of all families receive no labor income, but these are not necessarily either the poorest or the richest families. Moreover, the distribution of labor income per head continues to show a kink, or change in concentration, in Bogotá and Lima. There is also a bend in the distribution for Medellín, but it occurs about the 90th percentile rather than, as with total income per head, in the middle of the distribution. We conclude that attention should be focussed on labor income both because of its great importance for most types of families in total income and because it appears to be generated at different income levels by two slightly different distributions, which may be related to basic characteristics of the households or their working members.

Table 4 shows the share of total income received from labor (both wages and salaries, and independent labor) by families in all three cities, classified according to the age, education, and occupation of the head, total family size and the number of employed members, and the income quartile. Except for families in which the head is over 64 and therefore likely to be retired, and the "other" occupational group in Colombia, there is hardly any group for which labor income is less than half of total income, and for most groups the share exceeds 70 percent. Except again for the aged, at least 40 percent of the households in each group receive *some* wage and salary income, and the share is usually above 60 percent; with a few exceptions (among small, elderly, highly-

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*T A B L E 4 Percentage Share of Total Household Income Received from Wages and Salaries and from Independent Labor Income, by Household Characteristics*

| | Bogotá | | Medellín | | Lima | |
| | Wages | Independent | Wages | Independent | Wages | Independent |
|---|---|---|---|---|---|---|
| *Total* | 43.6 | 28.5 | 36.5 | 28.8 | 54.1 | 25.5 |
| *Quartiles* | | | | | | |
| 1 | 54.1 | 24.7 | 51.4 | 20.2 | 62.5 | 20.3 |
| 2 | 51.2 | 20.6 | 47.5 | 17.9 | 52.8 | 29.8 |
| 3 | 42.7 | 28.2 | 50.3 | 16.9 | 58.5 | 24.5 |
| 4 | 41.0 | 30.8 | 28.8 | 35.4 | 52.1 | 25.5 |
| *Education* | | | | | | |
| None | 34.2 | 31.9 | 24.2 | 27.5 | 43.2 | 35.0 |
| Primary | 38.9 | 26.2 | 34.6 | 22.7 | 52.4 | 28.7 |
| Secon-dary | 37.8 | 28.3 | 33.2 | 30.7 | 48.8 | 26.0 |
| Higher | 40.6 | 31.0 | 34.2 | 38.3 | 51.6 | 22.6 |
| *Occupa-tion* | | | | | | |
| Prof. | 41.4 | 30.8 | 31.2 | 38.9 | 50.4 | 25.6 |
| Clerical | 42.1 | 30.5 | 39.8 | 35.2 | 49.0 | 31.7 |
| Laborer | 38.6 | 31.4 | 46.4 | 27.7 | 54.1 | 31.9 |
| Other | 27.8 | 16.6 | 17.9 | 12.5 | 56.5 | 17.4 |
| *Age* | | | | | | |
| Under 35 | 51.0 | 25.1 | 48.2 | 26.9 | 58.0 | 26.8 |
| 35–49 | 37.7 | 30.0 | 37.1 | 32.4 | 52.9 | 24.6 |
| 50–64 | 29.7 | 33.3 | 21.9 | 27.9 | 44.8 | 29.6 |
| Over 64 | 21.9 | 10.0 | 3.2 | 15.9 | 44.5 | 15.2 |
| *Members* | | | | | | |
| 1–2 | 43.4 | 22.1 | 39.7 | 15.5 | 34.4 | 38.2 |
| 3 | 41.2 | 34.1 | 33.0 | 30.3 | 70.7 | 9.8 |
| 4–5 | 37.2 | 31.3 | 40.6 | 24.6 | 53.0 | 22.9 |
| 5 or more | 38.8 | 26.9 | 30.9 | 31.1 | 48.2 | 28.0 |
| *Working Mbrs* | | | | | | |
| 1 | 37.6 | 32.8 | 36.5 | 34.2 | 50.7 | 22.6 |
| 2 | 50.2 | 22.9 | 54.8 | 18.0 | 52.2 | 28.7 |
| 3 or more | 51.5 | 27.6 | 30.6 | 47.6 | 53.1 | 32.2 |

Source: Total and quartile data, Junta del Acuerdo de Cartagena, *Grupo Andino: distribución de ingresos y estructura del consumo (area urbana)*, document J/PR/68 (Lima: 15 March 1976), tables A-1-A-4, A-1-D-4, and A-IV-4. All other shares from Ferber, "Income Distribution and Income Inequality," tables 6.1–6.5.

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educated, or "other" occupational groups), at least 30 percent of the households in each class receive *some* income from independent labor.[18] Finally, 76 percent of households in Colombia and 81 percent in Lima depend on wages or on independent labor as their principal source of income.[19]

The other two kinds of income considered—from capital and from transfers—are received by rather few families and are therefore highly concentrated. Their distributions nearly coincide in each city, but this does not mean they are received by the same households. Capital income is received mostly by high-income households, even when imputed rent is included; the richest quartile of total income Y obtains 60 percent of all income from capital in Bogotá, 73 percent in Medellín, and 74 percent in Lima.[20] If imputed rent is excluded, the share received by the richest quartile is much higher. In contrast, the top quartile receives only 56 percent of all wages and salaries in Bogotá, 49 percent in Medellín, and 58 percent in Lima. We do not therefore consider further any association between poverty and income from capital.

*Poverty and Dependence on Transfers*

Public transfers appear to have no overall effect on the concentration of income; private transfers, however, including those between families, lower the Gini coefficient from 0.486 to 0.472 in Bogotá and from 0.503 to 0.487 in Lima.[21] The poorest quartile of families always gets a larger share of transfer income $Y_{tra}$ than it receives of total income Y. The shares are respectively 7.6 and 6.7 percent in Bogotá, 8.0 and 6.4 percent in Medellín, and 9.7 and 6.0 percent in Lima. Moreover, private transfers, but not public ones, make an appreciable difference in the welfare of the families in the poorest decile. In Bogotá, these families receive 1.80 percent of total income, but only 1.55 percent of the total income other than private transfers; in Lima the corresponding shares are 1.36 and 0.84 percent. (Public transfers, in contrast, actually *reduce* the share of the poorest decile since they consist largely of pension payments through the social security system, to families that are not very poor.)

These findings suggest that the receipt of transfer income might serve to identify poor families, particularly the very poor. As table 5 shows, however, there is very little association between poverty and dependence on transfers, even when we *exclude* households with retired heads (which may be receiving pensions related to past labor income, and should not be expected to be poor). The shares in the table are percentages of all the households in a given range of $Y_{tra}/Y$ who fall into the first decile, or the first four deciles, of C/N; 80 percent of families in Bogotá, 70 percent in Medellín, and 90 percent in Lima get no transfers, or receive less than 10 percent of their income in that form. In every city, close to 10 percent of these families are in the poorest decile and close to 40 percent in the poorest four deciles. There is some variation from these levels among households that depend on transfers for more than 10 percent of their income, but frequently the sample is too small to permit any conclusions. Overall, dependence on transfers is *not* an indicator of poverty, so there is no reason to consider the total of this type of income further.

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The situation might be different for those households that receive transfers from other households, usually their relatives, rather than from employers or from the state; 88 percent of households in Bogotá, 77 percent in Medellín, and 98 percent in Lima report receiving less than 10 percent of their income in this form. Table 5 also shows the analysis for this type of income. The conclusion that receipt of transfers is not a good indicator of poverty is unchanged, except perhaps in Medellín, where families with a high dependence on intra-family transfers are apparently overrepresented in the poorest deciles.

*Labor Income, Nonlabor Income, and Poverty*

The different types of nonlabor income separately do not serve to identify poor households. It may therefore suffice to consider the labor income of a family in order to judge whether it is poor. This would be convenient, since other income sources are somewhat less likely to be reported accurately in household surveys, and also because the use of labor income as a poverty indicator would permit the uses of other data sources such as workplace surveys. We therefore ask the following question: If a household is poor, on the basis of its labor income alone,

*T A B L E 5    Poverty and Dependence on Transfer Income*

*Percentage of Households in a Range of Transfer Income Dependence, in the First Decile, and the First Four Deciles, of C/N*

| Transfer Income | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| | 1 | 1–4 | 1 | 1–4 | 1 | 1–4 |
| Share (percent) | | | | | | |
| Less than 11 | 10.01 | 40.18 | 8.40 | 37.16 | 9.36 | 39.85 |
| 11–30 | 16.11 | 43.02 | 14.32 | 53.12 | 12.52* | 38.00 |
| 31–50 | 3.39* | 45.17* | 9.30* | 37.10 | 15.93* | 59.09* |
| 51–90 | 9.44* | 31.67* | 10.33* | 36.13* | 0 | 28.17* |
| Over 90 | 0 | 22.67* | 9.65* | 43.37* | 0 | 44.83* |

*Percentage of Households in a Range of Intra-Family Transfer** Income Dependence, in the First Decile, and the First Four Deciles, of C/N*

| | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| | 1 | 1–4 | 1 | 1–4 | 1 | 1–4 |
| Less than 11 | 10.47 | 39.97 | 8.40 | 37.68 | 9.35 | 39.57 |
| 11–30 | 10.71* | 35.85 | 14.40* | 46.53 | 15.58 | 49.35* |
| 31–50 | 4.85* | 34.70* | 12.40* | 28.18 | 0 | 79.49* |
| 51–90 | 12.88* | 42.42* | 10.27* | 55.75 | 0 | 0 |
| Over 90 | 0 | 16.67* | 12.88* | 57.67* | 0 | 0 |

*Fewer than 10 observations.
**Transfers received from relatives.

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is it likely to have enough nonlabor income that its total income will lift it out of poverty? It does not matter, for this purpose, whether a family that is *rich* in labor income alone has much or little nonlabor income. Table 6 answers this question: households were classified by quartile of the distribution of income *per head*, and then within each quartile their labor income $Y_w$ and their nonlabor income $Y_n$ separately were assigned to deciles of the distribution of *total income*. The shares in the table then answer the following question: If a household is poor in labor income—its labor income alone would place it in the first decile, or in the bottom 40 percent, of the income distribution—what is the probability that its nonlabor income alone would place it in the first decile?

TABLE 6 *Percentage of Labor Income—Poor Households Whose Nonlabor Incomes Fall in the First Decile of Total Income*

|  | Quartile of Income per Head | | | | |
|  | 1(poor) | 2 | 3 | 4 (rich) | Total |
|---|---|---|---|---|---|
| *Labor-Income Poverty* |  |  |  |  |  |
| Bogotá: 1st decile | 94 | 49 | 19* | 4* | 64 |
|        1st four deciles | 95 | 66 | 41 | 21* | 69 |
| Medellín: 1st decile | 79 | 56 | 28* | 4* | 52 |
|        1st four deciles | 82 | 74 | 56 | 10* | 66 |
| Lima: 1st decile | 98 | 91 | 66* | 0 | 95 |
|        1st four deciles | 99 | 93 | 63 | 35* | 88 |

*Fewer than 10 observations

In the population of Lima, and particularly in the poorer half of households (the two bottom quartiles of Y/N), that probability is very high. The probability is considerably less in the Colombian cities, but it is still true that in the bottom quartile of Y/N at least 80 percent of labor-poor families are also non-labor-poor. We conclude that poor households do not generally have any significant nonlabor income (particularly, we surmise, if imputed rent is excluded). Therefore, they can be identified on the basis of low labor income alone. If we exclude imputed rent and consider labor incomes as a share of all remaining income, we obtain the individual mean percentages in the two poorest quartiles shown in table 7.[22]

Another approach to this question is taken in table 8. We classify households in quartiles of the distribution not of total labor income but of labor income per person employed, $Y_w/N_w$.[23] Then we ask how likely it is that a family that is

TABLE 7

|  | Bogotá | Medellín | Lima |
|---|---|---|---|
| 1st quartile | 88.86 | 79.40 | 89.64 |
| 2nd quartile | 83.82 | 73.55 | 89.79 |

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poor by this standard (that is, low average pay for its working members) is poor according to the measure of per capita consumption. If there were no association between $Y_w/N_w$ and $C/N$, 10 percent of the households should be in the first decile of $C/N$ and 40 percent should be in the lowest four deciles. Instead, we find shares of about 20 percent and 60 percent, respectively, in the first quartile of $Y_w/N_w$, 14 percent and 60 percent in the second quartile, and much lower values at higher labor incomes per worker. Clearly a high value of $Y_w/N_w$ is almost never associated with poverty, while a value below the median implies a fairly high likelihood that the family is poor: its low labor income per person employed is not often compensated either by a very low dependency ratio, or by significant nonlabor income per head.

*T A B L E 8* *Percentage of Households Poor by Labor Income per Employed Person, Who Are also Poor in Consumption per Head, in the First Decile, or First Four Deciles, of C/N*

| Quartiles of $Y_w/N_w$ | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| | *1* | *1–4* | *1* | *1–4* | *1* | *1–4* |
| 1st | 23.05 | 60.36 | 18.44 | 48.20 | 20.49 | 61.44 |
| 2nd | 14.89 | 59.01 | 13.95 | 60.44 | 13.06 | 60.67 |
| 3rd | 3.21 | 32.57 | 5.53 | 37.32 | 1.47 | 27.46 |
| 4th | 0 | 4.79 | 0 | 9.78 | 1.71 | 8.30 |

*Labor Income, Dependency, and Poverty*

Our evidence thus far suggests that the poor can be closely identified with low labor incomes. If we measure the latter by $Y_w/N_w$, then in order to link it ot $C/N$ we need to take account of the ratio $N_w/N$ (people employed to total household size). $N_w/N$ is related to the dependency burden $(N - N_w)/N_w$ or $(N/N_w) - 1$, which each working member must support. We begin by showing, in the first part of table 9, that the dependency burden is typically high (or $N_w/N$ is low) for most families in all cities.[24] Roughly half or more of all households have only one member in five working, or less; at least 80 percent have no more than one member in three employed. (No distinction is made in the table between children and nonworking adults.)

The second part of the table then shows that the higher the dependency burden, the more likely the family is to be poor. However, the association is not so strong that $N_w/N$ alone is a good predictor of poverty. A household with a dependency burden of four or more is only a little more likely to be poor than is a family chosen randomly. When the burden is very high—eight or more dependents per worker—the likelihood of extreme poverty rises still more, but is still not above 20 percent. This happens largely because very wealthy households can afford to include many dependents and still maintain high consumption per head.

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*TABLE 9*

*(Percentage) Distribution of the Proportion of Household Members Employed*

| Percent Employed $N_w/N$ | Dependency Burden $(N/N_w) - 1$ | Bogotá | Medellín | Lima |
|---|---|---|---|---|
| 0–10 | Over 8 | 14.2 | 28.0 | 6.8 |
| 11–15 | 5.6–8 | 25.1 | 20.6 | 16.8 |
| 16–20 | 4.1–5.5 | 20.2 | 20.8 | 23.2 |
| 21–33 | 3–4 | 28.6 | 22.0 | 35.9 |
| 34–50 | 2–3 | 7.5 | 8.2 | 14.9 |
| 51–100 | Under 2 | 4.3 | 0.4* | 2.5 |

*Proportion of Families, Classified by Proportion of Members Employed, Who Are Poor*

| Percent Employed $N_w/N$ | Dependency Burden $(N/N_w) - 1$ | Bogotá 1 | 1–4 | Medellín 1 | 1–4 | Lima 1 | 1–4 |
|---|---|---|---|---|---|---|---|
| | | All Households | | | | | |
| 0–10 | Over 8 | 20.4 | 45.2 | 16.6 | 56.7 | 11.8* | 51.4 |
| 11–15 | 5.6–8 | 13.1 | 52.4 | 14.0 | 51.4 | 15.7 | 51.6 |
| 16–20 | 4.1–5.5 | 10.0 | 40.1 | 4.4* | 28.6 | 13.0 | 38.9 |
| 21–33 | 3–4 | 4.9 | 32.7 | 4.7* | 25.5 | 6.8 | 40.5 |
| 34–50 | 2–3 | 6.2* | 19.5* | 0 | 10.8* | 2.6* | 25.3 |
| 51–100 | Under 2 | 4.1* | 18.9* | 0 | 63.9* | 0 | 12.1* |
| | | Middle or Low Stratum Only | | | | | |
| 0–20 | Over 4 | 14.8 | 56.8 | 13.1 | 53.4 | 14.3 | 46.9 |
| 21–100 | 4 or under | 5.4 | 30.5 | 3.6 | 23.4 | 5.4 | 35.5 |

*Fewer than 10 observations.

Households in the high stratum are therefore excluded in the last part of table 9. Now it appears (in the middle and low strata) that a family with more than four dependents per worker is about three times as likely to be extremely poor as one with fewer dependents. If $N_w/N$ and $Y_w/N_w$ are taken into account simultaneously, there is a stronger association with poverty, of course, but even then the share of poor families is not extremely high. For example, of the households with $N_w/N$ of 20 percent or less (a dependency burden of four or more per employed person), for which labor income per worker is in the first quartile, only 45 percent fall into the poorest four deciles of $C/N$ in Medellín, and the share is only 58 percent in Bogotá, and 67 percent in Lima. This last value is much above 40 percent, but it still says that such a household is less than twice as likely to be poor as a family chosen at random.

The ratio $N_w/N$ can be decomposed into the adult employment rate (share

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of adults who work, ignoring children with employment) and the share of adults in the household. The first variable might be associated with poverty, if in poor families more adults are forced to work, while richer households take part of their consumption in the form of increased leisure. No association would appear, however, if employment rates are lowered in poor families by the need to look after children (whereas servants perform this function in wealthier households), or adults are more likely to work when the incomes they can earn are higher. As table 10 shows, there is very little association between adult employment rates and poverty, in any city; and this is equally true for the low socioeconomic stratum taken separately.[25]

TABLE 10 Employment Rates among Adults, and Poverty: Percentage Shares of Households in the First Decile, and the First Four Deciles, of Consumption per Person

| Range of $N_w/N_a$ (Percent) | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| | 1 | 1–4 | 1 | 1–4 | 1 | 1–4 |
| All Households | | | | | | |
| 0–25 | 13.5 | 38.4 | 8.9 | 46.7 | 7.6 | 35.0 |
| 26–33 | 11.4 | 47.9 | 5.8* | 30.6 | 5.8 | 36.8 |
| 34–50 | 7.5 | 38.9 | 10.8 | 37.3 | 13.1 | 44.7 |
| 51–100 | 10.6 | 31.9 | 12.2* | 26.3* | 7.6* | 39.9 |
| Low Stratum Only | | | | | | |
| 0–25 | 14.4 | 43.4 | 13.4 | 64.3 | 14.7 | 62.2 |
| 26–33 | 11.9* | 53.9 | 8.3* | 39.1 | 9.1 | 53.3 |
| 34–50 | 10.2 | 47.1 | 15.9 | 51.4 | 16.8 | 57.6 |
| 51–100 | 13.0* | 40.0 | 16.7* | 30.4* | 11.5 | 56.4 |

*Fewer than 10 observations.

## 3. EX ANTE CLASSIFICATION AND POVERTY

Here we examine a number of variables, all nonfinancial, which might fit the criteria for poverty indicators described earlier. The several variables examined are of two general types. One characterizes the neighborhood or the dwelling in which people live, while the other describes the people themselves, as individuals or as a household.

### Neighborhood Stratification and Poverty

All large cities include neighborhoods identified as "rich" and others considered "poor"; in fact, this knowledge is commonly exploited to make a sample more efficient, by oversampling households in the "rich" neighborhoods.[26] Granted that these distinctions are not arbitrary and can be fairly well-known to people familiar with the city, it is still not obvious that such a classification readily

separates the poor from the not poor. The "poor" areas of Latin American cities are generally characterized by high densities, dilapidated or shanty housing, and an absence or undersupply of water, sewage, and garbage services and other amenities. Since they are relatively easy to locate, it is of interest to know whether in fact the majority of poor families live in such areas, or whether most families in such areas are poor.

The ECIEL survey samples were divided into three strata (with further division of the low stratum in Lima). The assignment of a block or a neighborhood (cluster of blocks) to a particular stratum depended on the average character of the dwellings composing it, taking account of size, construction material, condition, and the availability of municipal and private services. This stratification greatly increased the efficiency of the surveys, but it does not appear to have provided a very good indicator of poverty. As table 11 shows, the high stratum always includes very few poor families, and none at all in extreme poverty; such cases as appear could easily be due to response error. At the opposite extreme, the low stratum includes most of the poor households in the city, but it also includes many families that are not poor. The proportion of low-stratum households in poverty ranges from 46 to 57 percent, with 12 to 14 percent in extreme poverty. This happens because the low stratum is so large, typically including some 60 to 70 percent of the population, that it is quite heterogeneous with respect to consumption per head. (The middle stratum appears to vary greatly among cities in its association with poverty.)

This result should not be interpreted to mean that neighborhood stratification is useless for locating poverty, but only that the strata defined for sampling the whole population may be inefficient. A much smaller "low" stratum might be defined so as to consist almost entirely of families in poverty, just as the small high stratum consists (almost) entirely of nonpoor families. We cannot

*T A B L E  1 1  Ex-Ante Stratification and Poverty: Percentage of Households in Each Socioeconomic Stratum in the First Decile, and the First Four Deciles, of C/N*

| Stratum | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| | 1 | 1–4 | 1 | 1–4 | 1 | 1–4 |
| High | 0 | 2.47* | 0 | 1.73* | 0 | 1.60* |
| Middle | 9.17 | 33.94 | 0.28* | 13.13 | 0.98 | 7.84 |
| Low | 11.99 | 46.38 | 13.90 | 52.69 | 13.81 | 57.31 |
|   Central City (Lima) | | | | | 11.99 | 54.18 |
|   Marginal (Lima) | | | | | 16.98 | 62.72 |
| Share of households in each stratum | | | | | | |
| High | 6.89 | | 6.93 | | 2.50 | |
| Middle | 32.50 | | 25.37 | | 32.65 | |
| Low | 60.61 | | 67.70 | | 64.86 | |

*Fewer than 10 observations.

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test a narrow stratification with these data, except to a limited extent in Lima, where the marginal slums concentrate more poverty than the poor neighborhoods in the central city.[27] Even then a family living in these slums is less than twice as likely to be poor as a family selected at random.

There are two difficulties with attempting to locate the poor by where they live.[28] The first is heterogeneity of dwellings and of living standards even within blocks or other small units. The second problem is that even when the dwellings in a neighborhood are more alike, the link between income or welfare levels and the type and condition of the dwelling is complex. It clearly depends on the age of the household head and the number and ages of other members. Expenditure functions estimated for housing expenditure from these data show a nearly constant budget share devoted to housing; sharply declining expenditures for larger families, out of a given total expenditure; and increased spending as the dwelling has more rooms. Households tend to spend less on housing when it is rented or occupied rather than owned, when the dwelling is made of materials other than brick or concrete, and when it is other than a house; and they tend to spend more as the head is older.[29]

Another complication in classifying families geographically is that the price of housing may vary among neighborhoods, so that even households with the resources to move from a poor to a nonpoor area choose to stay, to take advantage of lower cost, neighborhood ties, convenience to work, and other features.

*Characteristics of the Dwelling*

We have examined four physical characteristics of the dwelling (type and construction material; the presence of water and electricity; the tenancy of the dwelling; and a measure of density, or the number of people per sleeping room). In the case of tenancy, type, and construction material, there are always three or more classes, and most of those classes are *not* associated with poverty or with the absence of poverty. As table 12 shows, there is for each variable one class that does identify poor families to some extent. Thus if a family occupies a dwelling without either owning or renting it, there is a 20 percent chance or better that the household is extremely poor, and a 60 to 70 percent chance that it is in the poorest four deciles of consumption per head. However, this class mixes squatters with a few much wealthier people who receive housing free as a family gift or a form of income in kind.

The household is also more than ordinarily likely to be poor if it lives in a single room or in a tenement: in either case such facilities as a toilet and a kitchen are shared with other families. About 70 percent of such families are poor, in all three cities.[30] We expect to find poverty also among households living in dwellings made of scrap metal, fiberboard, burlap, and other materials that the family assembles into a shelter. The samples include very few such dwellings, however: the majority of the poor probably live in structures of brick or adobe, which are distinguished from wealthier families' homes by the *quality* rather than the *material* of construction. At least in Bogotá and Lima, dwellings

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*T A B L E 1 2  Housing Characteristics of Poverty: Percentage of Households in a Given Housing Category, in the First Decile, and the First Four Deciles, of C/N*

| Characteristic and Category | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| | *1* | *1–4* | *1* | *1–4* | *1* | *1–4* |
| Tenancy: "other" (neither owned nor rented) | 24.04* | 67.88 | 23.90* | 70.28 | 22.67 | 59.81 |
| Type: room, or tenement (common facilities) | 26.36 | 72.07 | 24.49* | 69.39 | 16.72 | 70.96 |
| Construction: materials other than brick or cement** | 17.35 | 45.72 | 12.38 | 43.34 | 19.25 | 59.24 |

*Fewer than 10 observations.
**In Medellín, adobe only (60 percent of dwellings are constructed of adobe).

made of something other than brick or concrete are somewhat identified with poverty, but the connection is slight and does not appear in Medellín. We conjecture that a given building material will identify poor families *provided* it is recognizable ex ante as inferior *and* is used by a rather small fraction of households (perhaps 5 to 20 percent).

If a dwelling lacks piped water or electricity, the family is fairly sure to be poor and has only a very low chance of being in the richest four deciles. The identification of poverty with the absence of these services improves, naturally, as there are fewer families without the service: this is evident if Bogotá or Medellín is compared with Lima, in table 13. The advantage of these criteria is that they are likely to locate entire neighborhoods not reached by municipal services. In much poorer cities, however, the identification would be less exact.

*T A B L E 1 3  Lack of Water and Electricity, and Poverty*

| Share of Households Lacking Service | | Distribution among deciles of C/N | | |
|---|---|---|---|---|
| | | *1* | *1–4* | *7–10* |
| Bogotá: Water | 1.24 | 48.39 | 100.00 | 0 |
| Electricity | 1.51 | 33.77 | 86.09 | 0 |
| Medellín: Water | 1.91 | 36.13 | 86.39 | 0 |
| Electricity | 2.30 | 16.09 | 71.30 | 9.57 |
| Lima: Water | 18.61 | 18.43 | 62.39 | 18.59 |
| Electricity | 15.50 | 23.42 | 68.65 | 14.84 |

*Household Density*

If the characteristics of the dwelling are not, with a few exceptions, good indicators of poverty, that may be because a given dwelling is used differently by families at different income levels. A "rich" house can hold many poor families, where it would hold only one richer household. We therefore define a family density as the number of members per sleeping room, and study its distribution and association with poverty in table 14. In general, the more people share a room, the more likely the family is to be poor, at least once the density exceeds one person per room. At densities above four people per room, there is a chance of 70 percent or more that the household is poor, and it is quite likely to be extremely poor. High densities probably characterize families living in single rooms and families with large numbers of children.

T A B L E  1 4  *Percentage of Households Classified by Density in the First Decile, or First Four Deciles, of C/N*

| Density (people per sleeping room) | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| | 1 | 1–4 | 1 | 1–4 | 1 | 1–4 |
| 1 or less | 12.90 | 43.43 | 1.24* | 15.73 | 5.40* | 21.14 |
| 1–2 | 2.81* | 16.10 | 2.02* | 14.40 | 0.44* | 9.42 |
| 2–4 | 6.09 | 33.79 | 6.99 | 44.59 | 6.94 | 39.75 |
| Over 4 | 22.95 | 69.61 | 27.54 | 75.32 | 22.03 | 72.57 |

*Fewer than 10 observations.

We may summarize these findings as follows. Properly defined, neighborhoods or geographic areas probably can be closely associated with poverty: the narrower the definition, the more precisely poor families can be located. The absence of municipal services may help in this definition. The right way to characterize poor neighborhoods will vary from city to city as a function of the level of economic development and other features. Characteristics of individual dwellings are not generally useful for identifying poverty, although there are a few exceptions. Of those examined here, the use of common plumbing and cooking facilities is the best indicator. Finally, it is helpful to combine information about the dwelling with information about the family. The density of sleeping accommodations is an example of this kind of description.

*Household Composition*

It was suggested at the end of part 2 that a family is likely to be poor if there are many children per adult member. If the working adults have low individual incomes, the family cannot escape from poverty by having more members work, since children can add little to income. If one or more adults have very high incomes, however, the family can afford to have many children and still not be

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poor. Therefore $N_a/N$ should be related to $C/N$—families composed more of adults should have higher consumption—but the relation should be stronger if we exclude from consideration households with high individual incomes.

Table 15 shows the relation of $C/N$ to $N_a/N$, first for all households in the population and then separately for the low socioeconomic stratum. In Bogotá and Lima there are very few families with more than four children per adult, whereas such families are more common in Medellín. This is partly because the Colombian survey excludes supplementary members, who are always adults. If such members do not contribute, out of their separate incomes, to expenditures for the children in the household, then it is proper to exclude them; if they do contribute, then they should be at least partly included. In either case, there is a clear association between consumption per head and the number of children each adult must support: As $N_a/N$ declines, the probability rises steadily that the family is poor. The association is about the same in the low stratum as in the whole population but more regular, and because rich families have largely been excluded all the shares are slightly higher. In general, a family with two or more children per adult (four or more children for a two-parent nuclear family) has a better than average probability of being poor, and if there are more than four children per adult, the household is almost sure to be in poverty.

*T A B L E  1 5*  *Family Structure (Proportion of Adults in the Household) and Poverty: Share of Households in Different Classes of $N_a/N$ in the First Decile, and the First Four Deciles, of $C/N$*

| $N_a/N$ | Children per Adult Member | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|---|
| | | *1* | *1–4* | *1* | *1–4* | *1* | *1–4* |
| | | *All Households* | | | | | |
| 0–0.2 | More than 4 | 13.44* | 54.85* | 32.03 | 73.49 | 0* | 100.00* |
| 0.21–0.33 | 2–4 | 19.34 | 56.35 | 18.21 | 50.00 | 25.14 | 65.88 |
| 0.34–0.50 | 1–2 | 10.06 | 40.09 | 8.31 | 36.79 | 14.47 | 48.87 |
| 0.51–1.00 | Fewer than 1 | 5.05 | 27.99 | 3.20* | 31.18 | 4.88 | 32.05 |
| | | *Low Stratum Only*** | | | | | |
| 0–0.2 | More than 4 | 0* | 49.70* | 46.86 | 88.81 | 0* | 100.00* |
| 0.21–0.33 | 2–4 | 23.43 | 71.60 | 27.67 | 70.24 | 27.56 | 73.72 |
| 0.34–0.50 | 1–2 | 13.05 | 47.06 | 11.82 | 49.55 | 20.15 | 63.85 |
| 0.51–1.00 | Fewer than 1 | 5.84 | 32.64 | 4.68 | 41.90 | 8.15 | 50.77 |

*Fewer than 10 observations.
**For shares of households in the low stratum, see table 11.

*Personal Characteristics: Some General Considerations*

Previous work with the ECIEL survey data has examined the association between total household income and three personal characteristics of the household head: education, age, and occupation.[31] We do not intend to review these

analyses, but only to infer from them which characteristics might be used to locate the poor. When only a few classes of a variable are distinguished, education appears to be the most powerful classifying characteristic, or the one that most sharply separates households by income level. This is, moreover, closely associated with occupation, since the class of professional, technical, and managerial jobs and the class of the university-educated consist largely of the same households. Both these variables are more powerful at identifying the rich than at locating the poor, it should be noted. In particular, no large occupational category appears to be systematically associated with low total income.

Age of household head, the other variable examined in previous research, has a strong effect on income for the highly educated, but much less of an influence for less educated families. It appears that education is probably the sharpest discriminant among different age-income profiles or life histories of income, but there has been little or no estimation of interactions between age and other variables. It is recognized that a considerable part of income variation among households may be due simply to age differences among families or individuals on similar age-income schedules.[32] This argues against the use of age alone as a classifying variable, since some households that look poor now might expect to be much better off later, or were at higher incomes earlier, while other families always have been poor and expect to continue poor.

Life cycle is subject to the same objection as a classifying variable. However, age and life cycle may be useful for classification since they are associated with changes in household size—which affects C/N directly—and in household composition—which affects C/N through dependency rates. It may be of interest to know whether there are particular points in the life cycle at which an otherwise nonpoor family may appear to be in poverty. It appears to be less dangerous to use education alone as a classifying variable, because the more educated are richer than the less educated at *all* ages. Although age-income profiles diverge with age, the most important feature of schooling is that it sets an individual initially on a higher earning curve. Thus a classification that identifies the very poor is unlikely to include many families that look poor only at a particular age. Most poverty is permanent, or at least insensitive to age differences, even though differences in age contribute appreciably to the overall inequality of income.

We close this discussion of occupation, education, and age by separating peoples' jobs—occupations and sectors of employment—from the personal characteristics that enable them to hold particular jobs or that determine their incomes in those positions. We consider next whether jobs are good indicators of poverty, taking account of the characteristics of the people employed in only one respect: working individuals are classified by whether they have or have not finished primary schooling, since this distinction is important for both the level and the concentration of income.

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*Occupation and Sector of Employment*

In studying these two variables, we are assuming that jobs can be classified so that occupation and sector are strongly related to the labor incomes of working individuals. In order for an individual's job to be a good indicator of whether his *family* is poor or not, two other relations must hold. First, consumption per head should be closely associated with the average labor income of the household's working members, at least at low-income levels. This is to be expected from the relative unimportance to poor families of all other sources of income. Second, individual labor incomes should be correlated within the household: there should not be, in the same family, working members who appear "rich" and others who appear "poor" when their individual incomes are considered. This also is to be expected, since if any member has a high income, other members have less need to work and presumably will seek employment only if they also can earn high incomes. The expected relation might not be observed, however, in families with so many dependents that one high labor income needs to be supplemented by other members' contributions even if their incomes are low.

The Peruvian data do not permit good tests of these relations, partly because the household head is defined "socially" rather than as the chief income-earner, and partly because much of the family's income may be incorrectly attributed to the head or improperly classified as to source. The data for Bogotá and Medellín, however, tend to support both relations, as table 16 shows: the correlation of other labor incomes in the family with the head's income is generally stronger than the association between welfare and average labor income. This intra-household correlation is also stronger, in both cities, in the low stratum than in the whole population.

In the analysis that follows, the value of C/N for the household to which an individual belongs is classed as being in the first quartile, second quartile, or upper half of the distribution, rather than by the first decile or lowest four deciles.[33] "Poverty" is identified with the first quartile of consumption per head. Table 17 shows the association between first-quartile poverty of the *household* and the sector of employment of *individuals* (11 sectors are distinguished). We note four features of the results. First, several sectors are represented by very few individuals in the lowest quartile, so it is hard to say anything about their relation to poverty. Second, many sectors have shares not too far from 25 percent, suggesting that in general, sector of employment is not a powerful indicator of poverty. Apart from any lack of correlation among labor incomes within a family, this will result from heterogeneity of occupation, skill, or education among jobs within a sector. Third, the construction industry generally stands out as paying low incomes, although it is not clear from these data whether this results primarily from low wages or from intermittent unemployment. Fourth, there are substantial differences among cities for some sectors, most notably the tobacco, wood, paper, rubber and leather industries, construction, and government.

Table 18 shows the same analysis, for occupational groups. (Some groups that yielded very few observations in the sample are omitted.)[34] The differences

*TABLE 16*

*Consumption per Head as a Function of Labor Income per Worker: Regressions of the Form* $C/N = b_o + b_1 Y_w/N_w$

| City and Stratum | Constant | $Y_w/N_w$ | $R^2$ |
|---|---|---|---|
| Bogotá: | | | |
| All households | 82.13 | 0.162 | 0.383 |
| | (6.532) | (0.007) | |
| Low stratum only | 78.27 | 0.125 | 0.258 |
| | (6.046) | (0.011) | |
| Medellín: | | | |
| All households | 71.12 | 0.104 | 0.333 |
| | (15.60) | (0.005) | |
| Low stratum only | 40.75 | 0.134 | 0.398 |
| | (4.096) | (0.009) | |

*Average Labor Income of Other Working Members as a Function of the Head's Income: Regressions of the form* $Y_{wo}/(N_w - 1) = b_o + b_1 Y_H$

| City and Stratum | Constant | $Y_H$ | $R^2$ |
|---|---|---|---|
| Bogotá | | | |
| All households | 69.75 | 0.539 | 0.527 |
| | (22.38) | (0.018) | |
| Low stratum only | −35.76 | 0.759 | 0.648 |
| | (19.56) | (0.029) | |
| Medellín: | | | |
| All households | 315.2 | 0.179 | 0.192 |
| | (25.67) | (0.013) | |
| Low stratum only | 11.65 | 0.655 | 0.569 |
| | (18.14) | (0.030) | |

Standard errors of regression coefficients in parentheses; $Y_w/N_w$ and $Y_H$ are always statistically significant.

among cities are quite striking, but they are largely due to very small sample sizes. In general, professional, clerical, administrative, and teaching positions are not associated with poverty. Occupations with a relatively high incidence of poverty are domestic service, construction jobs (especially unskilled labor, but even craftsmen are likely to come from poor families), and some industrial jobs, such as those in the shoe industry.

Since disaggregation among occupations or sectors often leaves very few observations, we cannot analyze these variables simultaneously with the full range of education in order to see whether low-paid jobs are largely occupied by the uneducated. We can, however, use the distinction between those workers who have, and those who have not, graduated from primary school (completed six years' schooling). Table 19 presents the shares of workers in these classes,

*T A B L E   1 7* (Adjusted) Percentage of Households in the First Quartile of Consumption
per Head, by Individual Sector of Employment

| Sector | Bogotá | Medellín | Lima |
|---|---|---|---|
| Farming and Mining | 31.2* | 21.1* | 20.0* |
| Food Industry | 24.4* | 12.7* | 32.0* |
| Tobacco, Wood, Paper, Rubber, and Leather Industries | 37.7 | 24.4 | 25.3 |
| Chemical, Metalworking, Electrical, Transport, and Other Industries | 24.3 | 20.4 | 29.2 |
| Construction | 53.4 | 43.9 | 29.9 |
| Electricity, Gas, Water | 0** | 32.2** | 38.0** |
| Commerce | 19.9 | 23.4 | 32.1 |
| Banking and Insurance | 9.7* | 9.9* | 7.0* |
| Transportation | 28.7 | 28.9 | 23.2 |
| Government | 14.0 | 38.8 | 9.7 |
| Other Services | 20.5 | 19.2 | 28.9 |

*Sample of fewer than 10 individuals from first-quartile households.
**Sample of fewer than 10 individuals in total.

within selected occupations or sectors, and compares the share for the entire range of C/N with the proportion in the poorest quartile. If we exclude from consideration cases with fewer than ten observations, there is a slight tendency for workers from poor families to be less well-educated (to show a higher percentage of non-primary-school graduates). This is particularly noticeable for clerical employees (other than typists and messengers), skilled construction workers, mechanics or operators, salespeople, and government employees. It is not evident, of course, whether education is a screening device for allocating the better-paid jobs or is a real prerequisite for certain positions. Neither is any account taken of capital intensity, modernity of technology, scale, or other features of an industry or sector that might be related to individual incomes.

CONCLUSIONS

In very general terms, the results presented here indicate that it is not very difficult to "find the poor" through household survey data, and that relatively few variables are needed for satisfactory distinction between poor and nonpoor families. At the same time, it is clear that some variables expected a priori to discriminate between poverty and nonpoverty do not serve very well, and that it is necessary to take account of some interactions among variables. It is also found that it may be easier to identify the rich (to separate them from the lower and middle strata) than to identify the poor.

In all three cities studied, poverty households are mostly characterized by low labor incomes. In particular, if a household is poor in labor income alone, its nonlabor income is very unlikely to lift it out of poverty. Besides constituting the

bulk of the income of poverty households, labor income is nearly as concentrated as total income and has a very similar distribution. Moreover, apart from imputed rent, the poor receive very little income from capital and not much from transfers either. Transfer income goes mainly to nonpoverty households, reaches few poverty households, and seems to have little effect on overall income concentration.

Consumption per head, the preferred welfare measure, is strongly influenced by labor income per worker and by the dependency burden of the household, the latter measured by the proportion of household members who are not employed. The dependency burden, however, is not so closely related to per capita income as is labor income per worker. Family composition, in the sense of the proportion of family members that are adults, seems to be especially important at low income levels in identifying poverty. Labor incomes tend to be correlated within a family, so that low income of the principal earner will mean poverty unless there are few dependents. Since children can earn relatively little, families with low individual incomes are poor if they have many children

TABLE 18 (Adjusted) Percentage of Households in the First Quartile of Consumption per Head, by Individual Occupation

| Occupation | Bogotá | Medellín | Lima |
|---|---|---|---|
| Professional | 5.6* | 5.1* | 2.1* |
|    Teacher, Nurse, Midwife | 11.5* | 0 | 7.0* |
|    Administrator | 0 | 0 | 3.6* |
| Typist | 6.3* | 24.0* | 2.8* |
| Other Office Employee (except | | | |
|    messengers) | 11.7 | 8.8* | 17.1 |
| Sales (Own Business) | 4.9 | 0 | 26.0 |
| Sales (Employee) | 19.9 | 34.3 | 41.1 |
| Other Sales Jobs | 20.8* | 17.1* | 25.5* |
| Transport Worker | 32.0 | 29.6 | 19.7 |
| Industrial Worker: Textiles, Clothing | 42.8 | 26.9 | 27.8 |
| Shoemaker, Shoe Industry Worker | 38.5 | 45.1 | 42.3* |
| Skilled Construction Worker | 50.6 | 48.3 | 38.4 |
| Skilled Mechanic or Operator | 25.8 | 14.7 | 35.7 |
| Other Laborer or Operator | | | |
|    (except highly skilled) | 27.8 | 32.0* | 38.8 |
| Construction Laborer | 78.1* | 52.3** | 15.7** |
| Other Services | 33.1 | 26.3 | 38.9 |
|    Police, Military | 29.9 | 24.6* | 7.8* |
|    Domestic Service | 85.6 | 47.4* | 60.0 |
|    Restaurant Employee | 10.2* | 5.2* | 57.3 |
| Other Service (or unreported) | 26.7* | 100.0** | 10.2* |

*Sample of fewer than 10 individuals in the first quartile.
**Sample of fewer than 10 individuals altogether.

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*T A B L E  1 9  Percentage of Non-Primary-School Graduates, for Selected Sectors of Em-*
*ployment and Occupations, First Quartile, and Total, of C/N*

| | Bogotá | | Medellín | | Lima | |
|---|---|---|---|---|---|---|
| *Occupation or Sector* | *1* | *All* | *1* | *All* | *1* | *All* |
| Professional | 0* | 1 | 0* | 0 | 0* | 3 |
| Administrative | ** | 5 | ** | 0 | 19* | 1 |
| Typist | 0* | 4 | 0* | 15 | 0* | 2 |
| Other Office Employee | 24 | 12 | 16 | 10 | 8 | 4 |
| Sales (Own Business) | 0* | 19 | ** | 30 | 38 | 23 |
| Sales (Employee) | 64 | 42 | 59 | 60 | 27 | 32 |
| Skilled Construction | 73 | 54 | 61 | 49 | 30 | 25 |
| Unskilled Construction | 76* | 73 | 0* | 0* | 0* | 22* |
| Shoemaker | 71 | 76 | 62* | 52 | 48* | 42 |
| Skilled Mechanic | | | | | | |
| or Operator | 42 | 34 | 28 | 24 | 30 | 18 |
| Domestic Service | 94 | 95 | 100* | 84* | 52 | 50 |
| Banking and Insurance | 24* | 8 | 100* | 19 | 0* | 6 |
| Government | 18 | 18 | 49 | 30 | 20 | 7 |

*Sample of fewer than 10 observations.
**No observations in the first quartile.

per adult member. Because adult/child ratios vary among families, and because any occupation or sector of employment contains a variety of jobs with different rates of pay, it is not easy to associate family poverty with individual jobs, except in a few lines of employment. Overall, occupational information is only weakly associated with welfare status, unless account is also taken of individuals' levels of schooling and their ages. Education is the most powerful discriminatory variable, but it is still not very powerful in locating the poor.

Families living in poverty may be identified independently of the personal and job characteristics, and the family composition, which actually account for their poverty. That is, the consequences of poverty may be just as helpful as the presumed causes in locating which households are poor and in associating them with possible remedial policies. With sufficient attention to the norms of the population in a particular city, one can use characteristics of neighborhoods and dwellings to find the poor. Particularly valuable characteristics of this sort are the lack of municipal services and high densities within dwellings.

These findings can be used to draw inferences about public policy only with great caution, since we have examined rather small samples in only three cities, and since the features that indicate poverty are not always linked to variables that can be affected by public intervention. Nonetheless, a few conclusions can perhaps be drawn.

One implication is that for raising incomes, the primary focus is probably best placed on labor markets and on improving the incomes of household heads (principal earners). From this point of view, higher wages would seem to be

more effective than providing more job opportunities, particularly for those families that consist largely of children and have little or no unemployed adult labor potential. Such households could also be helped directly by policies aimed at improving children's welfare. For the long run, the results support the view that reduced population growth could be very important in reducing poverty (although the effect may be overstated in this study by the use of number of family members rather than adult equivalents).

Another implication is that extension of existing income-transfer policies is likely to have little effect on poverty, since most of the benefits go to nonpoor households. The poor are probably helped much more by transfers in kind, such as food price subsidies and the provision of municipal services and housing. It is not clear, however, whether such policies are efficient in reaching the households most in need: substantial benefits can probably be obtained for them only by raising the labor incomes on which their welfare depends, or by reducing the dependency burden on each poor working individual.

NOTES

1. These concerns are summarized in Hollis Chenery et al., *Redistribution with Growth: An Approach to Policy* (New York: Oxford University Press for the World Bank, 1974).
2. These criteria hold if the object is to identify groups *all* of which may be reached by government policy. If it is desired only to affect the poor, it does not matter if the nonpoor are quite heterogeneous and differ considerably in welfare.
3. See Rafael Prieto Durán, *Estructura del gasto y distribución del ingreso familiar en cuatro ciudades colombianas, 1967–68* (Bogotá: Universidad de los Andes, 1971), and Adolfo Figueroa Arévalo, *Estructura del consumo y distribución de ingresos en Lima metropolitana, 1968–69* (Lima: Pontificia Universidad Católica del Peru, 1974).
4. Philip Musgrove, *Consumer Behavior in Latin America* (Washington, D.C.: The Brookings Institution, 1978), chap. 2, "Household Incomes."
5. Robert Ferber, "Income Distribution and Income Inequality in Selected Urban Areas of South America," mimeographed. (Washington, D.C.: The Brookings Institution, August 1975). Published in translation as "Distribución de ingreso y desigualdad de ingresos en algunas areas urbanas," *Ensayos ECIEL* 3 (August 1976).
6. See chaps. 3, 4, and 5 of Musgrove, *Consumer Behavior*; the studies by Prieto and Figueroa cited earlier; Howard J. Howe, "Estimation of the Linear and Quadratic Expenditure Systems: A Cross-Section Case for Colombia" (Ph.D. dissertation, University of Pennsylvania, 1974); and Howard J. Howe and Philip Musgrove "Analysis of ECIEL Household Budget Data for Bogotá, Caracas, Guayaquil, and Lima," in Constantino Lluch, Alan Powell, and Ross Williams, *Patterns in Household Demand and Saving* (New York: Oxford University Press for the World Bank, 1977).
7. These are William R. Cline, "Income Distribution and Economic Development: A Survey, and Tests for Selected Latin American Cities"; Adolfo Figueroa and Richard Weisskoff, "Viewing Social Pyramids: Income Distribution in Latin America"; and Philip Musgrove, "Permanent Household Income and Consumption in Urban South America." All three papers were presented to a conference sponsored by ECIEL and held under the auspices of the Institut für Iberoamerika Kunde, Hamburg, Germany, 1–3 October 1973. The paper by Weisskoff and Figueroa has been published as "Traversing the Social Pyramid," LARR 11, no. 2 (1976):71–112, and that by Musgrove in the *American Economic Review* 69 (June 1979). All three have been published in Spanish in *Ensayos ECIEL*: Figueroa and Weisskoff in 1 (1974), Musgrove in 2 (1975), and Cline in 4 (1977).

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8. These estimates are summarized and compared to family incomes, for Colombia, in Philip Musgrove, "Potential Earnings, Subsistence Needs, and Poverty in Urban Colombia," Paper presented to the Conference on Distribution, Poverty, and Development, CEDE, Universidad de los Andes, Bogotá, Colombia, 2–4 June 1977. The most extensive estimates are from Howe, "Linear and Quadratic Expenditure Systems"; the others, and comparable estimates for Peru, are from Aquiles Arellano, "La pobreza en diez ciudades sudamericanas," mimeographed (ECIEL, 1977).

9. This is the basis of the "Orshansky index" used to define poverty in the United States. See Molly Orshansky, "Counting the Poor: Another Look at the Poverty Profile," *Social Security Bulletin* 28 (1965) and "How Poverty is Measured," *Monthly Labor Review* 92 (1969).

10. Estimated by plotting log $Z$ (food) against log N; the data are from Howe, "Linear and Quadratic Expenditure Systems," table 7.20, p. 299.

11. This leads to systematic bias only when the variable(s) by which families are classified, in seeking to identify poverty, explicitly distinguish between adults and children, or among categories of expenditure.

12. "Permanent income" refers to the concept developed by Milton Friedman, *A Theory of the Consumption Function* (Princeton, N.J.: Princeton University Press for NBER, 1957). Permanent income is the household's concept of long-term income on which it bases its consumption decisions; differences between this and observed income in any interval are called "transitory." Part of consumption is also transitory, but it is assumed to be unrelated to transitory income.

13. Musgrove, *Consumer Behavior*, table 2–18.

14. Another way to approach this question is to ask *for which families* it is most important to divide $Z$ by N. Clearly the per capita adjustment has the greatest effect for values of N far from the modal value—that is, for very large or very small households. See Carmel Ullman Chiswick, "Income Distribution in Thailand: Measuring Poverty," IBRD Research Project No. 671–36, Working Paper A–1, mimeographed (Washington, D.C.: World Bank, March 1976), pp. 10–13. For an extensive discussion of the superiority of per capita over total measures, see Simon Kuznets, "Demographic Aspects of the Size Distribution of Income: An Exploratory Essay," *Economic Development and Cultural Change* 25 (Oct. 1976).

15. Since permanent consumption $C_p$ is by definition an exact function of $Y_p$, there is no need to treat it separately.

16. Musgrove, "Permanent Household Income." $Y_p$ was estimated with three occupational variables and twelve combinations of age and education, and—in Colombia—dummy variables for city. More accuracy can be achieved by adding more explanatory variables, but the cost and difficulty rise very rapidly.

17. Some forms of income, notably capital other than imputed rent on owned dwellings, may be expected to be received mostly by rich households, but the absence of such income is too widespread to aid in separating the poor from those who are neither rich nor poor.

18. Ferber, "Income Distribution and Income Inequality," tables 5.1–5.5.

19. Musgrove, *Consumer Behavior*, table 2–7. The figure for Colombia includes Barranquilla and Cali together with Bogotá and Medellín.

20. Musgrove, *Consumer Behavior*, table 2–11. The share in Bogotá is unusually low. (Shares for Medellín and Lima are typical of those in other cities.)

21. Cline, "Income Distribution and Economic Development," tables 2 and 4.

22. The individual mean percentage is the mean of the shares for individual households; it is not the ratio of mean income of one type to mean total income. Labor income shares are from Musgrove, *Consumer Behavior*, table 2–5, and imputed rent shares are from table 2–9.

23. $Y_w$ refers to cash income plus the imputed value of domestic production. $N_w$ refers only to members with paid employment, excluding unpaid family workers, and so is biased downward for some families.

24. $N_w/N$ is biased downward in the Colombian cities, by the exclusion of supple-

mentary members (adults who work and pay something toward the family budget, while keeping much of their own budgets separate) from some households. No such bias exists in the estimates for Lima, which use the most inclusive concept of the household. In all cities, domestic servants are not counted in $N_w$; they are included in N for Lima but not for Bogotá or Medellín.

25. The relation of C/N to the overall employment rate $N_w/N$, the adult employment rate $N_w/N_a$ (and the share of adults in the household $N_a/N$), is extended to seven other Andean cities—two each in Colombia, Ecuador and Venezuela, plus Santiago, Chile—in Philip Musgrove, "Household Size and Composition, Employment and Poverty in Urban Latin America," *Economic Development and Cultural Change* (forthcoming).

26. In the ECIEL samples, a "rich" household is about three or four times as likely to be interviewed as a "poor" household, in Colombia, and twenty-one times as likely in Peru. All the calculations are weighted so as to represent the population without distortion.

27. It is widely believed in Lima that nearly all the city's poverty is to be found in the marginal squatter settlements. Thus, the surprising finding of this study is not that those neighborhoods are indeed poor, but that there are also many equally poor families living in the center of Lima. On this point see Figueroa, *Estructura del consumo*, pp. 28–31 and 91–92 (Figueroa's analysis is based on total income Y rather than C/N).

28. At least, these problems arise in large cities. Geographic location may still be an important classifying variable because of large urban-rural income differences, or differences between cities or between different rural areas. For evidence on the concentration of poverty in rural areas, see Weisskoff and Figueroa, "Traversing the Social Pyramid," sections 3 and 4.

29. Musgrove, *Consumer Behavior*, tables 5-1, 5-5, 5-8, 5-12, 5-14, 5-15, 5-16, and 5-18.

30. Poor families tend to be concentrated more in houses than in apartments, because any free-standing single-unit dwelling, even a shack, is classified as a house. There is no strong association between houses and poverty, however.

31. See in particular, Musgrove, *Consumer Behavior*, chap. 2, part 3, and Weisskoff and Figueroa, "Traversing the Social Pyramid." Family size N was also associated with Y in these analyses, but we exclude it here since our welfare indicator is a per capita measure. See also Ferber, "Income Distribution and Income Inequality," tables 2.1 and 2.2.

32. See Vladimir Stoikov, "How Misleading are Income Distributions?," *Review of Income and Wealth*, series 21, no. 2 (June 1975); Morton Paglin, "The Measurement and Trend of Inequality: A Basic Revision," *American Economic Review* 65 (Sept. 1975); and Kuznets, "Demographic Aspects."

33. To the extent that $N_w$ is negatively correlated with C/N, more than 25 percent of working *individuals* will belong to households in the poorest quartile of consumption per head. This effect must be removed in judging whether a particular sector or occupational class is closely associated with poverty. If $P_1$ is the proportion of all employed people coming from first-quartile households, then the index of association with poverty for a given class i of occupation or sector is 25 $Pi_1/P_1$. A value of 25 ($Pi_1 = P_1$) means that the class is not more related to poverty than is the entire labor force. In Bogotá and Lima, $P_1$ is about 27 percent, while in Medellín it is only 24 percent.

34. Some "occupations" are found in only a single "sector," so the two variables are not always distinguished. Any such case analyzed in table 17 is omitted from table 18. In other cases, "occupation" is more disaggregated than "sector," as for commercial jobs, construction, and clerical workers.
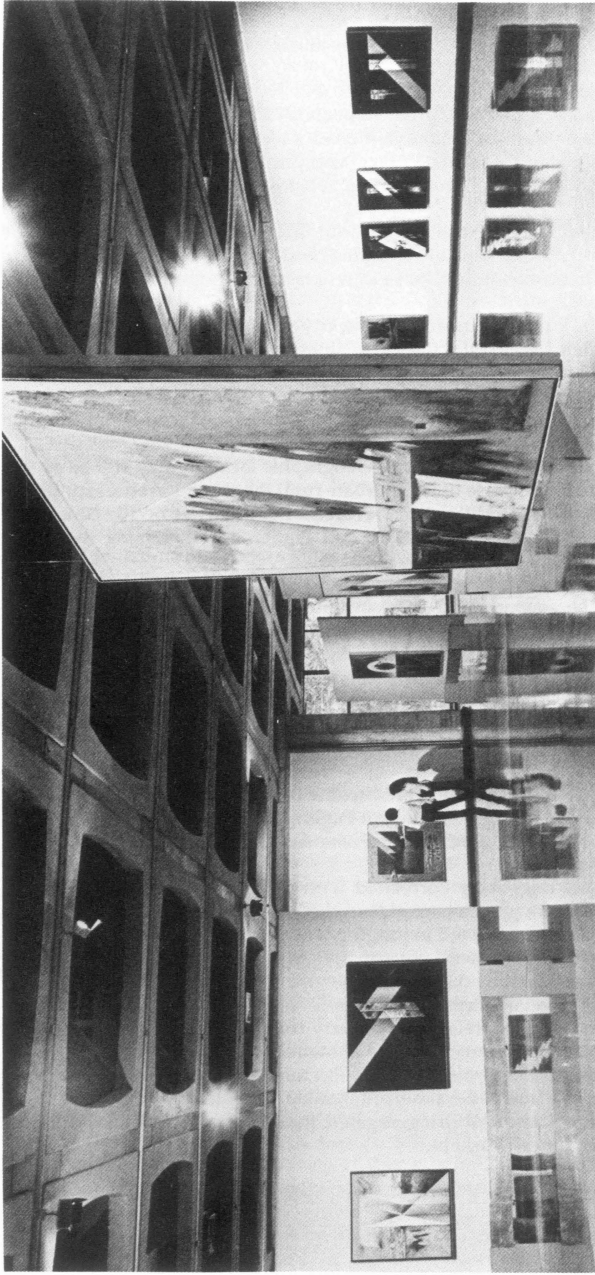
*Exhibition: Works of Pérez Celis. Museo Bellas Artes, Caracas, Venezuela, 1978.*

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