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INTRODUCTION

The interrelationships between migration and development have been the topic of much academic and policy discussion.[1] The results of previous research have differed depending to a large extent on the development model and empirical methodologies. In referring to this situation, Brown states that migration can be seen as "a process that is responsive to different factors at different stages of development, and that ambiguities in research findings can be accounted for by reference to the development milieu characterizing a given situation."[2]

Circular (temporary, seasonal, semi-permanent, etc.) migratory events have probably become the most frequent type of spatial move, not only in Guatemala, but also in many of the poorer agricultural countries of tropical Latin America, Sub-Saharan Africa, and Southeast Asia.[3] This type of migration has always been common in those countries whose exports come primarily from plantation agriculture. However, with increasing modernization and commercialization of the agricultural sector, the overall seasonalized pattern of mobility between well-delineated regions has become less important. Accordingly, new patterns of temporary migration have emerged in Latin America. [4]

This paper explores the relationship between circular migration and one of its possible social consequences: changes in a young child's nutritional status. We raise two questions that have received little attention: (1) Are circular migrants at higher risk to certain negative consequences, in this case, malnutrition of their children, than their nonmigrant neighbors? (2) If they are a special risk group, is this more related to their low socioeconomic status or to the actual experience of frequent, temporal migratory events? That is, do certain patterns of circulation affect malnutrition more than other patterns? While our previous research has associated seasonal migrant families with higher levels of a young child's malnutrition, the "status" effect and the "migration" effect have not been sorted out.[5]

The policy implications are apparent. Most Latin American governments are placing the highest of demographic priorities on questions of population redistribution.[6] Moreover, concern is expressed over evidence of increasing pauperization, underemployment, landlessness, malnutrition, and general social instability in many countries.[7] Improved demographic measurement of increasing territorial mobility and analysis of its determinants and consequences within the context of social change are needed to help formulate more effective development plans and strategies.

METHODS AND STUDY AREA

Our data comes from two overlapping and complementary Guatemalan studies that provide an unusual opportunity to explore the relationships between circular migration and young children's nutritional outcomes. One source is the INCAP/Rand field survey in 1974-1976 of social, economic, and biomedical factors relating to birthspacing, infant mortality, and child development in four rural Guatemalan communities.[8] The other source is the INCAP longitudinal study of nutrition, physical growth, and mental development carried out in these same communities between 1969 and 1976.[9] As part of the longitudinal study, all four villages were provided with basic health services and, as part of the nutrition intervention study, free food supplementation was offered daily at the health center. In two of the villages, a higher calorie and protein drink (*atole*) was given, in the the other two, a low calorie, no protein drink (*fresco*).

The four villages ranged in population from 650 to 1100 and are located in a dry, mountainous department to the northeast of Guatemala City. The two larger villages (one *atole*, one *fresco*) lie very close to a major highway that in about one hour brings residents into the capital by bus. The other two smaller villages are more isolated--from 30-90 minutes further away from the capital on infrequently traveled dirt roads.

Small scale agriculture was the predominant economic activity in the villages, with maize and beans as the main subsistence crops, and tomatoes and chiles as the main cash crops. Most farmers cultivated less than two hectares of land, the minimum considered necessary to feed the average family.[10] The situation of many land-poor farmers, situated in this semi-arid area subject to unreliable rainfall was conducive to frequent seasonal migration.

Our interest in the phenomena of circular migration arose out of difficulties encountered in the longitudinal study of health and nutritional status. The rural study communities were selected in 1969 in part because they were found to have highly stable populations with little permanent out-migration that could have depleted the already small sample size.[11] However, during the study, unexpectedly high seasonal or temporary migration caused loss of important data that had to be collected systematically and periodically, such as anthropometry, morbidity, and food consumption.[12] Moreover, health post personnel complained that they had to "start all over again" with children who seasonally migrated and returned ill and undernourished. Thus, in the subsequent INCAP/Rand field study, particular attention was directed at individual and family migration of an impermanent, temporary, and seasonal nature. Migration data were collected through male and female life histories, agricultural and demographic censuses, and population registers.

This paper analyzed socioeconomic and demographic variables measured retrospectively and cross sectionally in the surveys, merged with prospective data on nutritional, biomedical, and demographic variables collected on these same families. The migration data come principally from the residence and employment sections of the male retrospective life history instrument. This was administered to 467 male spouses (less than 60 years old) of the main subjects of the study (ever-mated women 14-44 years of age), resident in the villages in 1975-1976. The social, economic, agricultural, and demographic data collected in this retrospective instrument were supplemented by more in-depth data on income, employment, land tenure, agricultural production, family structure and housing characteristics in concomitant cross sectional, agricultural, and population censuses on these families.

The nutrition data analyzed here are based on anthropometric measures of weight and height collected between 1969 and 1976 at the health posts, on all children living in each of the four villages. These children were weighed within 24 hours of birth and every three months thereafter until 24 months, then every six months until 48 months, and at 60, 72, and 84 months.

PATTERNS OF CIRCULAR MIGRATION

The concept of impermanent migration has been identified by a variety of terms: seasonal, sporadic, recurrent, commuter, returnee, migrant farm labor, sojourner, and circular.[13] The pattern of impermanent migration most appropriate for our study area seems to be what Chapman defined as circulation: "The basic principle in circulation is territorial division of activities and obligations."[14] On the one hand, the home community provides security, kinship ties, and common values and beliefs. A circular migrant never severs *residential* ties with the permanent home base, and always intends to return after being absent for seasonal and/or irregular intervals.

Migration history data, DaVanzo notes, have several advantages for studying this type of migration over the more conventional types of migration data collected in censuses and most surveys:[15] More moves are recorded, time intervals can be chosen with greater flexibility, and patterns can be analyzed over time, and when combined with a broader life history, interrelationships between migration and social and economic change can be studied. However, the data are also subject to two sources of possible bias, typical of retrospective data: cohort sample decay through death or emigration, and recall error or mistiming of events.[1]

Circular migrants were identified in this study by constructing summary variables from the residence and employment histories and migration family context questions in the life history instrument. These variables include:

1. Residence: permanence, duration, location, and size of place.
2. Employment: duration, type of job and enterprise, number of years worked in same seasonal job.
3. Migration context: members of family who accompanied male migrant, how often he/they visited home.

[1] To minimize this latter bias, great care was taken in survey and interviewer preparation, slanderization, and follow-up.

A *circular migrant* is defined as a current resident of the study communities who temporarily changes his county (municipio) of residence for three weeks or longer, but not for more than 12 months, and/or reported taking up a temporary job outside the county of residence. *Commuting circular migrants* were those who returned home almost every night and commuted alone. Excluded are the impermanent migrants who resided outside the study communities for over 12 months and never returned "home" to visit.

Categorization of Circular Migrants

Policymakers need up-to-date information on existing social groups that should be targeted for specific interventions. In this paper, we use the "functional classification" approach to identify groups at high risk of malnutrition.[17] Circular migration variables of frequency, duration, and family context, mentioned earlier, are combined to construct a three-group classification: Perennial, occasional, and commuter (daily). (To minimize risk of memory loss bias and permit cross-checking the retrospective data with the INCAP prospective data, we use retrospective information only for the seven years prior to the survey.)[2] The resulting three categories are indicators of the recent and present strategies of small farmers in adapting to ongoing transformations in the agrarian society.

Those defined as *perennial seasonal migrants* are men who outmigrated in over half of the seven years in the period; *occasional seasonal migrants* outmigrated in less than half of the seven years; and *commuters* are those circular migrants who returned home almost every afternoon after working outside their county of residence. There was some overlap between commuters and seasonal migrants: 6.3% of the perennial and 3.8% of the occasional migrants were also commuters at one time during the seven-year period.[3]

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[2]The male retrospective life history data, collected in 1976, benefited greatly from demographic data on these same families collected on an on-going basis since 1969, and were cross-checked with these data for reliability. Discrepancies merited revisits to some families.

[3] Double-counting was avoided by placing the migrant in the category of longest duration during this period.

The distribution of these circular migrant groups plus the residual nonmigrant group is shown in Table 1 for current residents in the study villages. Nearly half of the male sample had been circular migrants during the seven-year period. Seasonal migrants were nearly evenly split between perennial and occasional categories, while very few were classified as commuters. There was a significantly higher percentage of perennial seasonal migrants living in the two low supplementation villages, over one-quarter of the men from such villages migrated yearly or almost every year in the 1969-1975 period.

Table 1

DISTRIBUTION IN CIRCULAR MIGRANT STATUS CATEGORIES FOR PERIOD 1969-1975, OF MALE HEADS OF HOUSEHOLDS, BY CURRENT RESIDENCE IN GUATEMALAN STUDY VILLAGES

		PLACE OF USUAL RESIDENCE	
	All Villages	Two High Supplementation Villages	Two Low Supplementation Villages
MIGRANT STATUS	% (N)	% (N)	% (N)
Non-Migrant	49.7 (188)	58.2 (103)	42.3 (85)
Seasonal Migrant			
Occasional*	23.8 (90)	20.9 (37)	26.4 (53)
Perennial**	20.9 (79)	14.7 (26)	26.4 (53)
Commuter***	5.6 (21)	6.2 (11)	5.0 (10)
TOTAL	100.0 (378)	100.0 (177)	100.1 (231)

*One to three migrations during 1969-1975 period.
**Four or more migrations during 1969-1975
***Returned home daily after working outside of residence

Rates of circular migration revealed that perennial migrants left their usual place of residence in the villages 17.4 times in the seven-year period; and occasional migrants 12.2 times. On the other hand, perennial migrants stayed away fewer months per migration than occasional migrants: 6.2 vs. 8.6 months, respectively.[4]

Finally, as background for the subsequent analysis of factors related to nutrition in the four villages, selected social and economic characteristics of the circular migrant and nonmigrant groups are presented in Table 2. Commuters have the highest economic levels on the income and wealth indicators, and the perennial seasonal migrants come out lowest on most of the indicators. The occasional seasonal and nonmigrant statuses are generally in between. Looking at important "push" factors (occupation and land value), perennial migrants have the highest percentages of landless laborers or land-scarce farmers (70.3%), as opposed to 61.1%, 51.3%, and 42.4% for the nonmigrants, occasional seasonal, and commuters, respectively. Moreover, on the indicator of socioeconomic status found to be most predictive of health and nutrition outcome--house quality[18]--52.7% of the perennials had substandard houses, as compared with 46.1%, 32.1%, and 31.6% of the nonmigrants, occasionals, and commuters, respectively.

IV. SEASONAL MIGRATION AND YOUNG CHILDREN'S NUTRITIONAL STATUS

The success of migration as a strategy depends, of course, on its consequences for the family. We turn now to an examination of the relationships between seasonal (circular, noncommuting) migration and young children's nutritional status in these four rural Guatemalan villages. Our policy concern has to do with persistence of chronic, mild/moderate protein-energy malnutrition among young children in Central America.

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[4]See Teller, C., "Patterns and Determinants of Circular Migration in Guatemala."

Table 2

SELECTED 1974 SOCIAL AND ECONOMIC CHARACTERISTICS OF CIRCULAR MIGRANT AND NON-MIGRANT GROUP CATEGORIES

Socioeconomic Indicators	Non-Migrants		MIGRANTS Perennial Seasonal		Occasional Seasonal		Commuters	
	%	(N)	%	(N)	%	(N)	%	(N)
House Index								
Lower Quality	46.1	(81)	52.7	(40)	32.1	(25)	31.6	(6)
Higher Quality	54.0	(95)	47.4	(36)	67.9	(53)	68.4	(13)
Per Capita Income* ($ US)								
0-75	60.8	(107)	61.5	(49)	53.2	(41)	42.1	(8)
76-299	33.5	(59)	32.9	(25)	42.9	(33)	47.4	(9)
300 +	5.1	(9)	1.3	(1)	3.9	(3)	10.5	(2)
Land Value** ($ US)								
0	20.5	(36)	11.8	(9)	31.2	(24)	5.3	(1)
1-499	52.9	(93)	57.9	(34)	39.0	(30)	57.9	(11)
500 +	26.7	(47)	30.3	(23)	30.0	(23)	36.8	(7)
Occupation (Head)								
Laborer	13.9	(25)	10.8	(8)	7.7	(6)	5.3	(1)
Small Farmer	47.2	(85)	59.5	(44)	43.6	(34)	36.8	(7)
Large Farmer	28.9	(52)	24.3	(18)	35.9	(28)	31.6	(6)
Other	10.0	(18)	5.4	(4)	10.3	(8)	26.3	(5)
School Grades Completed								
0	55.6	(100)	63.5	(47)	56.4	(44)	73.7	(14)
1-5	40.6	(73)	35.1	(26)	41.0	(32)	21.1	(4)
6 +	3.9	(7)	1.4	(1)	2.6	(2)	5.3	(1)

*Nuclear Family
**Extended Family

Variables and Sample

Nutritional status is measured by two indicators--weight-for-age and weight-for-height--both expressed as a percentage of the NCHS standard for U.S. children.[10] Each indicator was measured by trained anthropometrists at regular intervals mentioned earlier.[5]

Among the explanatory variables, children's ages are derived from their birth dates, which were recorded by trained midwives in some cases and ascertained retrospectively from mothers in other cases. Because very little permanent migration occurred either into or between these villages, the location of each family in a high food supplementation (*atole*) village or a low food supplementation (*fresco*) village could be unambiguously recorded. All other explanatory variables were surveyed of fathers in a life history questionnaire. The values of these variables are calculated as of the time of the particular nutritional status measures recorded in the sample. Hence, a child's nutritional status at 18 months is associated in his data file with the characteristics of its family's house at that time and with its family's migration characteristics in the previous six months.

Table 3 shows means and standard deviations of these variables for the 4181 observations (on --- children) in the sample. The children were, on average, 3.13 years old and scored below the U.S. standard on weight-for-height and weight-for-age, particularly the latter. The nutrition status data and associated factors are described in other INCAP publications.[20]

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[5]A child aged six years and three months when the study began in 1969 would appear only once in this sample, namely when he was seven years old. Similarly, a baby born seven months before the study ended in 1976 would appear only once in this sample--when he was six months old. The maximum number of observations per child is 11, for a child aged seven in 1976 who lived his whole life in a study village. Hence we have multiple observations on many children. To the extent that unobserved variables induce positive correlation among all the observations of a dependent variable for the same child, the standard errors reported from the ordinary least square regressions are biased downward, and t-statistics upward. Subsequent analysis will include reestimation of these regressions using corrective variance components models.

Table 3

Variables in the Regression Analyses

(Unit of analysis is a six-month period between birth and seventh birthday in 1969-1976; n=4181)

Dependent Variables	Definition	Mean	Standard Deviation
Percent of standard weight for age at end of 6-month period	Child's weight for age as percent of NCHS standard for U.S. children.	81.30	85.12
Percent of standard weight for height at end of 6-month period	Child's weight for height as percent of NCHS standard for U.S. children.	96.64	7.50
Explanatory Variables			
Age	Child's age in months at end of the 6-month period.	37.61	15.09
Sex	Dummy variable=0 if child is female; 1 if male.	.45	.50
House	Additive scale comprising number of rooms, and type of floor, walls, and roof in house. Range is from 3 for worst to 14 for best.	5.60	1.82
High Supplementation Village	Dummy variable=1 if child lived in village offering a high supplementation intervention; = 0 if did not seasonally migrate.	.54	.50
Father's Seasonal Migration: Migrated in the period	Dummy variable=1 if the father seasonally migrated from the community in the 6-month period; = 0 if did not seasonally migrate.	.23	.42
Months migrated in the period	Number of months the father was seasonally migrating in the 6-month period (0 to 6).	.53	1.36
Percent of standard weight for age at start of 6-month period	Lagged value of dependent variable.	64.12	33.94
Percent of standard weight for height at start of 6-month period	Lagged value of dependent variable.	76.28	39.76
Months father migrated alone from a low supplementation village	For children in a control village, the number of months in the 6-month period when the father was seasonally migrating and the child was home.	.19	.86
Months fathers migrated alone from high supplementation village	For children in a high supplementation village, the number of months in the 6-month period when the father was seasonally migrating and the child was home	.23	.92
Months father migrated with children from low supplementation village	For children in a control village, the number of months in the 6-month period when the father and children (and perhaps others) were seasonally migrating	.03	.38
Months father migrated with children from high supplementation village	For children in a high supplementation village, the number of months in the 6-month period when the father and children (and perhaps others) were seasonally migrating.	.07	.53

In almost a quarter of the six-month periods in the sample, the father seasonally migrated from the village. On average, fathers who migrated did so alone more frequently than they took their children.

Regression Results

Table 4 reports estimates from regressions on children's weight-for-age as a percent of the NCHS standard for U.S. children. Regressions with weight-for-height as the dependent variable yield coefficient estimates of uniformly identical sign, but generally lower statistical significance.[6]

Columns (1) and (2) of Table 4 exhibit our basic regression model. The highly statistically significant age coefficients indicate that these children tend to gain on the U.S. standard as they age. When they are seven years old, children average 10.1 units closer to the standard than when they are born. Boys are generally further below their standard than girls, and children living in larger, better quality houses show higher nutritional status. Based on these assumed linear estimates, children in the best houses (House Scale = 14) average about 5% higher standardized weight than children in the worst houses (House Scale = 3). All of the explanatory variables considered, access to the nutrition intervention shows the strongest relationship with nutritional status. Controlling for the other factors, children living in high supplementation villages rate about 6-1/2 percent (5.2 standardized points) higher on standardized weight-for-age than children in low supplementation villages.

Our principal interest here is in the effects of seasonal migration.[7] Column (1) of Table 4 indicates that children whose fathers seasonally migrated in the six months prior to measurement had significantly lower nutritional status than children whose fathers did

[6]Our standard of statistical significance is a five percent level of significance. We apply a one-tail test for all variables except the migration variables. With these, the lack of previous theoretical predictions and empirical evidence suggests using the stricter two-tail test.

[7]Valverde, et al., 1982, summarize findings on the seasonality of nutritional status itself.

Table 4

NUTRITIONAL STATUS REGRESSIONS: CHILDREN LESS THAN SEVEN YEARS OLD IN 1969-1976 IN FOUR GUATEMALAN VILLAGES

(Observations are 4181 six-month periods; method of estimation is ordinary least squares; t-statistics in parentheses)

Explanatory Variables	Dependent variable is percent of standard weight for age at end of 6-month period		
	(1)	(2)	(3)
Age (months)	.12 (13.47)	.12 (13.48)	
Sex (male=1)	-.99 (-3.70)	-.98 (-3.67)	-.87 (-3.16)
High Supplementation Village (D)	5.23 (19.45)	5.20 (19.43)	5.20 (18.97)
House Scale (3-14)	.34 (4.69)	.35 (4.80)	
Father's Seasonal Migration:			
Migrated in the Period (D)	-.68 (-2.11)		
Months Migrated in the Period (0-6)		-.24 (-2.46)	-.26 (-2.61)
Intercept	72.58 (129.17)	72.53 (129.97)	78.91 (332.34)
R^2	.13	.13	.09

NOTE: Regressions also contain a dummy variable, not reported, to provide intercept adjustment for missing data on migration.

not seasonally migrate, though the effect is not large in magnitude. Column (2) shows that this association increases with the duration of father's time away. In this linear specification, a child whose family is away all six months prior to the anthropometric measurement falls 1.44 standardized points below a child whose father did not seasonally migrate. The remaining regressions include the duration-of-migration variable, because it is more informative.

Column (3) of Table 4 repeats Column (2), but without the potentially confounding variables, Age and House Scale, the remaining estimates are very stable. Hence the negative association between migration and nutritional status in Column (3), when Age and House Scale are not controlled, does not arise from a correlation of migration with these variables.

These results imply that, on average, children whose fathers have recently migrated have lower nutritional status. The Table 5 regressions show, however, that this association is very different according to whether the children accompanied their fathers and whether they lived in a high supplementation village. Column (1) of Table 5 indicates that the negative association between father's migration and children's nutritional status is stronger for children who stayed home than for those who migrated along with their fathers. In fact, children from the low supplementation villages who migrated with their fathers had higher nutritional status than otherwise similar children whose fathers did not migrate.

The Column (2) regression is like Column (1), but also controls for the child's standardized weight six months earlier; hence the other estimates in Column (2) approximately reflect associations with recent *change* in standardized nutritional status. Columns (3) and (4) repeat this pattern using standardized weight-for-height as dependent variable. Other evidence indicates that changes in nutritional status are generally more sensitive to short-term environment variations than are levels.[21] These additional regressions also suggest that children who stay at home while their fathers seasonally migrate suffer relative to children whose fathers do not migrate. The effect, however, is statistically insignificant in the high supplementation villages, suggesting that adequate food availability can insulate children from this effect.

As already noted, children who migrate along with their fathers (and in many cases, with other family members) appear to attain higher nutritional status than children who stay at home along with their fathers. This different pattern, depending on whether the child accompanied its father, may arise from differences in the types of

Table 5

Nutritional Status Regressions with Detailed Migration Characteristics: Children Less than Seven Years Old in 1969-1976 in Four Guatemalan Villages

Explanatory Variables	Dependent Variables at End of 6-Month Period			
	Percent of Standard weight for age		Percent of Standard weight for height	
	(1)	(2)	(3)	(4)
Age (months)	.12 (13.47)	.037 (5.83)	.096 (12.98)	.051 (8.25)
Sex (Male=1)	-.97 (-3.63)	-.14 (.77)	-.035 (- .16	-.016 (-.09)
High Supplementation Village (D)	5.07 (17.71)	1.81 (9.26)	2.53 (10.63	1.14 (6.14)
House Scale (3-14)	.36 (4.95)	.12 (2.49)	.49 (8.03	.20 (4.24)
Percent of Standard Weight for Age at Start of 6-Month Period		.83 (72.49)		
Percent of Standard Weight for High at Start of 6-Month Period				.70 (53.49
Months Father Migrated Alone from Low Supplementation Village	-.63 (-3.87)	-.11 (-.99)	-.49 (-3.60)	-.17 (-1.60)
Months Father Migrated Alone from High Supplementation Village	-.19 (-1.27	-.13 (-1.30)	-.03 (-.19)	-.04 (.42)
Months Father Migrated with Children from Low Supplementation Village	.74 (2.08)	.64 (2.73)	.26 (.87)	.39 (1.72)
Months Father Migrated with Children from High Supplementation Village	-.09 (.36)	-.03 (-.15	.56 (2.62)	.35 (2.14)
Intercept	72.53 (130.13)	11 .26 (12.06)	88.93 (191.87)	25.01 (20.14)
R^2	.14	.62	.10	.47

NOTE: Regressions alone contain a dummy variable, not reported, to provide intercept adjustment for missing data on migration. Regressions 2 and 4 also contain a dummy variable for missing data on previous measurement of nutritional status.

In regressions (2) and (4) the coefficient estimates (except for percent of standardized weight at start of six-month period) reflect the association of explanatory variables with the <u>change</u> in the dependent variable over the period. The associations in regressions (1) and (3), as in the regressions in Table 4, are with the <u>level</u> of the dependent variable at the end of the six-month period.

migrations. Fathers migrating alone from these villages are predominantly perennial migrants; families migrating together are predominantly occasional migrants. In addition, migration to the capital city (a more benign atmosphere, in general) is more common in the latter group.

Alternatively, it may be argued that the positive association for accompanying children arises partly from fathers leaving malnourished or sickly children at home but taking healthy ones along, rather than from any effect of the migration. This does not explain, however, why the accompanying children are better off than the children who stayed home along with their fathers. It does not seem plausible to us--based on the regularity of many men's perennial migration patterns and other considerations--that their children's poor nutritional status induced them to stay at home.

The size and statistical significance of all coefficients are smaller change regressions, (2) and (4), than in the level regressions, (1) and (3), but many of the estimates remain significantly different from zero. The migration variables in these regressions are generally less significant than in regressions (1) and (3), but retain the same signs. Because all of these explanatory variables except age tend to stay much the same over the childhood of individuals in this sample, we expect that the coefficient estimates will be larger and more significant when related to a dependent variable that more reflects the child's complete growth history, that is, the level of, rather than changes in, nutritional status. This is the case in regressions (1) and (3). Many of these estimates retain statistical significance in regressions (2) and (4), where the variables' associations with nutritional status at earlier ages are controlled. Hence, children's growth over a six-month period is associated with these characteristics of his/her environment during that period.[8]

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[8]It is interesting that much variance remains unexplained in regressions (2) and (4) of Table 5. These regressions control for the children's nutritional status only six months previously. Although imperfect measurement must account for some unexplained change, the examinations were conducted by well-trained and standardized workers in clinic conditions. Instead, it appears that substantial variation remains unexplained in terms of the variables documented here. Much of this may be of environmental origin.

Other regression results, not shown, can be briefly summarized. When the data are stratified, e.g., children's age, the strongest estimated associations are for children one to four years old. Next strongest are for children over four, and the weakest are for infants. This ordering is expected, since older children's nutritional status is well known to be less sensitive to short-term influences, and since most infants in the villages were breastfed through infancy and were therefore protected from most environmental insults.

In other regressions of the forms in Table 4, we substituted longer-term migration variables--months of seasonal migration in the last 12 months and the last five years. Although the estimated coefficients were similar, they were smaller and less significant. This, along with the smaller but persisting associations with *change* in nutritional status in Table 5, suggests that migration patterns display a short-term association with nutritional status. The longer-term observed consequences probably arise from a succession of short-term effects.

Finally, the regressions were run with natural logarithms of the dependent variables; all estimates were very similar.

V. CONCLUSIONS AND IMPLICATIONS

The following methodological, substantive, and policy implications can be drawn from this research:

- Retrospective survey instruments are a significant improvement over cross sectional questionnaires. However, the investment of resources in the instrument design, training, length of interview session, data cleaning and processing and analysis techniques is considerably greater. With prospective studies prohibitively expensive, retrospective approaches are becoming indispensable in the study of complex socioeconomic and demographic processes.
- The classification of circular migrants into distinct groups according to historical patterns (i.e., frequency, periodicity, family context, duration and destination) is conceptually important for policy purposes. The groups identified here

(perennial, occasional, and commuter) represent different life cycle and migration strategy conditions that are relatively more stable indicators of target groups for intervention programs than cross sectional indicators of a snapshot, short-term situation.

- The regressions presented here for standardized measures of children's nutritional status replicate associations with child's sex, family Socioeconomic Status, and access to nutritional supplementation, reported in the literature.
- The estimated average association between father's seasonal migration and child's subsequent nutritional status is negative. However, this negative association is entirely concentrated in families whose children stayed at home. While fathers seasonally migrate, these children suffered relative to those children of non-migrant fathers. This association was not significant, however, in the high supplementation villages, suggesting that food supplementation might be most effectively targeted to villages during peak periods of fathers' seasonal absence. Children who accompanied their fathers in seasonal migration actually experienced better nutritional status, but these are predominantly in occasional migrant families, who are more likely to go to the capital city. These findings emphasize the usefulness of interaction variables in regression analysis as a method of identifying specific at-risk populations.
- While a perennial pattern of seasonal migration may expose a child to persisting nutritional effects, specific migration episodes may also be associated with specific subsequent changes in nutritional status. An implication is that migration activity and patterns should be explicitly measured and their effects evaluated in nutrition and health studies. Another implication is that nutritional interventions might be most effective if they focus on the children of migrants during the migratory period and not after it.

- Since the survey was not designed specifically to investigate migration-related phenomena, these findings are only suggestive. Nonetheless, they point to possible causal relationships between migration and children's nutritional status, and to empirical regularities, whether or not causal, that may be useful in identifying at-risk populations for program interventions.
- Policymakers need to know the reasons for the persistence of high protein-energy malnutrition in those countries, like Guatemala, where infant and child mortality has been significantly reduced. Demographers can assist in measuring certain social change dynamics that may be involved in, or indicators of, the transformation of agrarian societies. If certain patterns of circular migration are increasing, their consequences for social well-being should be investigated before appropriate policy decisions can be made.

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