FINAL REPORT*

MINIMUM WAGE LAW AND NUTRITIONAL STATUS IN GUATEMALA

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I. BACKGROUND

A. Immediate causes of malnutrition and action programs

The presence of undernourished individuals in families and communities of developing countries results from a combination of low availability of adequate foods to meet the family's energy and nutrient requirements and/or the poor utilization of consumed foods by children and other members of the family. Programs geared to provide effective primary health care, potable water, hygienic disposal of excreta and garbage, control of domestic animals and adequate housing may reduce, significantly, the incidence and severity of infections. Therefore, health programs are likely to promote important increases in child survival and improvements of their growth patterns (1).

The availability of adequate amounts of foods for all members of a family is a consequence of the availability of foods at the community level and of the purchasing power (income and prices) of families. In free market open economies, if sufficient demand for food is present, market forces are likely to be in a position to supply enough foods to match such potential effective demand for food. Therefore, the problem of low availability of foods at the household level, in rural deprived communities, is more likely to be associated to their low purchasing power than to a lack of potential supply of foods. The prevailing low levels of income in rural areas of Central America result from the low cash gener .ing capacity of labourers and/or by the insufficient production of foods by subsistence farmers as relates to their

family's energy and nutrient needs.

Several approaches have been exercised by governments of developing countries to improve the purchasing power of deprived families. One frequent programatic approach, to tackle inadequate family income, is the participation of poor families in supplementary feeding schemes. There is nowadays controversy, in the scientific nutrition community, with respect to the role of supplementary feeding programs in comprehensive strategies focused to reduce poverty and malnutrition (2) and about short or long-term impacts in health and nutritional conditions of participant families (3).

Another government approach to subsidize the income of deprived families has been their participation in fair price shops programs. However, since the infrastructure responsible for delivering these services are always located in poor sections of large cities, or in the county seats of accessible rural towns, a great proportion of needy deprived families located in remote rural communities are not affected by these services (4). Another strategy to improve the purchasing power of the poor is to promote the development of programs directed to increase total family cash income. There are strong reasons suggesting that increases in total family cash income are likely to result, in the medium and long-term, in improvements in the nutritional status of children (5, 6).

Nonetheless, although income elasticities indicate otherwise, politicians and influential economic pressure groups in developing

countries generally single out that low-income families will not allocate significant portions of additional income to obtain goods and services which will improve their children's health and growth patterns*. Therefore, the need exists for information on the nutritional effects in children of important improvements in purchasing power of deprived families, whether the latter is the result of increases in income, reduction of prices, participation in sibsidized programs or a combination of all these intervention programs.

B. The opportunity to determine the impact of increases in minimum wages on children's growth

Few reports are available from developing countries describing changes on children's physical growth in the face of significant increases in total family income. In general, information relating family income and children's growth (i.e. weight and height) has been collected by means of cross-sectional studies. The only prospective investigation addressing the allocation of increased family income in poor families does not provide information on changes in prices or in anthropometric measurements. Therefore, it is difficult from that communication to estimate changes in family purchasing power and thus to analyze prospectively the relationship between income supplements and children's physical growth (6).

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*This argument was used by the local opponents to the Family Allowance Law approved in 1974 in Costa Rica which originally proposed direct cash subsidies to poor families. The original program was, therefore, modified to strengthen existing government health and nutrition services.

The economy of Guatemala is based on the export of agricultural products such as coffee, cotton, sugar and bananas. In spite of the fact that agricultural workers comprise a large segment of the labour force, few reports were available until 1977, which documented the nutritional and health conditions of these population groups. Most nutrition research activities carried out in Central America had focused their attention on children residing in poor, subsistence farming communities. Evidence from El Salvador (7) and Guatemala (8), indicates that the prevalence of malnutrition, among children under five years of age residing in agricultural plantations, is higher than the prevalence of malnutrition in children living in other type of communities.

The proportion of the total population residing in plantations in Central American countries is,by no means, large. For example, labourers and their families living in coffee plantations in Western Guatemala accounted in 1980 for 24.2 percent of the residents of the area (8). This figure did not take into account workers and their families living in the same geographical area in plantations dedicated to the cultivation of cotton, sugar cane or in cattle ranches. The Guatemalan Government estimated that in 1980 a total of 1,500,000 persons, of the country's 7,000,000 inhabitants, resided in coffee, cotton, and sugar plantations and in cattle raising farms.

The Government of Guatemala raised the minimum wage for agricultural workers from $1.12 to $3.20 per day as of March 1980. In most plantations, the change in minimum wages was effective during the last week of April and first week of May, 1980. The change in the minimum

wage law in 1980 provided INCAP with a unique opportunity for setting up a prospective evaluation addressing the impact of improvements in total family income on children's growth.

Section II reviews the published literature from different areas of the world on income and nutritional status. It is followed by the rationale for the present investigation (Section III) and the research objetives and hypotheses (Section IV). A description of the activities carried out with present funding support follows in Section V. The material and methods are described in Section VI while the results concerning each specific hypothesis are presented and discussed in Sections VII and VIII, respectively.

II. LITERATURE REVIEW ON FAMILY INCOME AND NUTRITIONAL STATUS

A. Income and food consumption

The level of income, food prices, the market prices of other essential goods and services, local food production, food consumption habits and the individual's energy expenditure, are all factors which have an effect on the total amount of food consumed by families and therefore, by individuals within these families. Thus, increases in family income, or reduction in food prices and/or other basic commodities, are likely to increase the effective demand for food in poor families. If the problem of malnutrition is in part related to low family purchasing power, it follows that increases in total amount of foods consumed by a family would be reflected in improvements in the nutritional status of children under five years of age.

There is a general belief, among nutritionists, not supported by hard data, that adults take a larger share of food available than is warranted by relative physiological requirements. Few studies have addressed properly this important issue. Selowsky analyzed food consumption data for adults, for children 10 to 14 and 1 to 4 years old from the Calcutta Food Survey of 1969 (9). When the daily calorie consumption of the three age groups, expressed as a percentage of requirements, is analyzed by monthly per capita expenditure level, and inverse relationship is reported between family income and the percentage of fulfillment of requirements for children aged from 1 to 4 years and for adults. As the per capita expenditure increases, the small children are able to meet 100 percent of their requirements, at lower levels of income expenditure, than the other age groups analyzed. Thus, Selowsky's results suggest that children aged 1 to 4 years will benefit relatively more, from an increase in purchasing power, than adults.

Flores, et al. (10) analyzed data from a food consumption survey conducted in rural Guatemala in 1965. These authors found that in children aged 1 to 4 years energy deficits, in relation to requirements, were greater than those found in the family as a whole. The correlation coefficient between family and children's intake was statistically significant ($r = 0.309$, $df = 128$, $p < 0.01$). They concluded that certain foods,as the staples,are regarded as appropriate for adults, thus an increase in family consumption of those foods did not necessarily imply an increment on children's intakes. However, an increment in the family diet of those foods regarded as suitable for children, such as

milk, does lead to a larger increase in children's intake than in adults. Devadas et al., have reported similar observations from India (11).

A study conducted in rural Guatemala has provided information on changes in consumption patterns of adults and children when the supply, at the family level, of the staple foods as corn and beans, is increased (12). The staple foods were distributed free to labourers residing in a coffee plantation located in Western Guatemala and the changes in energy and protein intakes, before and during the intervention,were measured in various age groups. The increases in energy and protein intakes were relatively higher, with respect to initial intake, in children under 24 months of age than in adult males, adult females and older children. When the dietary intake of adults and of children over 24 months of age was analyzed by specific foods, the staples distributed free accounted themselves for most of the observed increases in energy and protein intake. In contrast, for children under 24 months of age, the dietary increases were derived from an additional consumption of food items, not corn and beans, identified as more suitable for children in these communities (rice, milk, sugar). Thus, free distribution of corn and beans acted as an income supplement and some of the income liberated by the free distribution of staple foods was diverted to buy other foods for the very young (12).

It is generally accepted, and has been well documented by numerous studies, that poor families allocate most of their income to buy foods. A group of poor families in India spent 83 percent of their salary on food while a higher income group from the same community

allocated only 40 percent of their income to that type of expenditures (13). In Costa Rica, 57 percent of the agricultural workers from rural areas and 28 percent of families living in cities spend more than 60 percent of their total income on foods (14). However, it was estimated that 50 percent of all labourers could not purchase a diet which would be adequate for the entire family, even if they were to spend their total income on food (15).

One of the few studies, where direct cash subsidies were given to low-income families, was carried out in India during the period of 1965-1966 (6). The results reported from that study can be summarized as follows:

1. The allocation of additional income for different expenditures, such as food and housing, varies according to the initial level of family income.

2. At lower-income levels, the percentage of additional money allocated for food is higher (76 percent of extra income) than at higher income levels. In the lowest initial income groups, of the 76 percent of additional income spent on foods, 55 percent was allocated for staple foods.

Thus, the findings of cross-sectional studies, relating levels of income and food consumption, carried out in developing countries suggest that: (15-17):

1. At lower-income levels, the percentage of total income

allocated to food is very high.

2. As income increases, the percentage of total income allocated to food decreases, but the total quantity of food purchased is higher.

3. With further increases in income, the percentage of calories from cereals and other staple foods decreases.

4. At higher levels of income, there is greater consumption of animal and processed food products.

B. Income and physical growth

Several investigations from developed nations have focused on the relationship between family income and various physical anthropometric measurements. Boys and girls 5, 8, 13 and 16 years of age, from high socioeconomic classes in Edinburgh, were found to be taller and heavier than children from lower socioeconomic classes (18). Similarly, children 1, 3 and 5 years of age, from high social classes in various European countries were heavier and taller than those from lower social classes (19). Similar findings were reported from English and Scottish school-aged children (20). Height differences of 1.59 cms for boys and 1.42 cms for girls were reported when contrasting the upper and lower 15 percent of the income distribution in the United States (21).

The relationship between family income and the outcome of pregnancy has been documented in several developing countries. Greater

weight gains during pregnancy, and heavier and taller newborn children were reported in a study contrasting a middle with a low-income group in India (22). Similar findings, regarding income and the outcome of pregnancy, have been reported from China (23), Ghana (24), India (25, 26), and Argentina (27).

The effect of family income on growth in children under 5 years of age has been studied in Ceylon (29), India (29-32), Costa Rica (33, 34), Guatemala (35), rural areas of Central America (36), Colombia (37-39), Brazil (40), Ethiopia (41), and Nigeria (42). All these studies report greater weights and/or heights in children from high-income groups when compared to children of low-income families.

At 6 years of age, girls from two social classes in Colombia had a height difference of 8.3 cm which decreased to 6.5 cm at 20 years of age (43). Differences of 2.75 kg in weight at 6 years of age dropped to 1.46 kg at 20 years of age (44). In India, differences of 7 cm in height and 2.0 kg in weight, between children from high and low-income families, have been also communicated (45). In this study, boys at 10 years of age from the higher-income families were 11.2 cm taller and 4.7 kg heavier than their counterparts from low-income families (45). At 14 years of age, Chilean children from high-income groups were 12 kg heavier and 10 cm taller than children from the lowest income group (46). Rana has also reported differences, related to income per capita levels, in weights and skinfolds of industrial labourers in Pakistan (47).

The absence of nutrition-related differences in the outcome of pregnancy (48), or attained weight and/or height in preschool children (49-52), is probably due to the relatively narrow range of income levels in the study populations (48, 50).

The relationship between family cash income and the nutritional status of children of labourers' families, residing in ten coffee plantations or rural Guatemala, was reported several years ago (53). No significant differences were observed in the prevalence of growth retardation, as determined by the three indexes used (less than 75 percent weight for age, less than 90 percent height for age, and less than 90 percent weight for height) for the 3 to 36 months age group when these children were classified by levels of Annual Family Per Capita Income (AFPCI) ($P > 0.05$). For those children aged 36 to 60 months the prevalence of growth retardation was higher at lower levels of income ($P < 0.05$).

Thus, cross-sectional research findings suggest a relationship between levels of family income and children's growth patterns.

III. RATIONALE FOR THIS INVESTIGATION

One major goal of development processes in Third World Countries is to provide to all members of their societies the opportunity to fulfill their basic needs. Among these needs the availability of enough food at the family level, and the access to efficient health services and adequate housing are included. There is some controversy about the relative importance, for improving health and nutritional conditions, of

increments in purchasing power of families. For some scientists, politicians and pressure groups such improvements are negible as, they claim, poor families will not allocate an important proportion of their increments in income to obtain more food, better health services or better housing conditions. On the other hand, other groups argue that the analyses of cross-sectional retrospective data are not the best approach to address the issue of changes in family income and their effect on children's growth pattern. The issue will be better studied by prospective investigations where the increments in income can be documented and the research design provides an opportunity to control for secular changes in growth patterns and for the effects of other socioeconomic events or interventions taking place in the community (i.e., inflation, provision of other services).

Thus, the following factors argued strongly for a prospective study of this nature to be conducted in Guatemala to provide documented results for economists, nutritionists and other professionals interested in the potential effects of different government interventions in the erradication of poverty and malnutrition:

1. A significant minimum wage increase, affecting undernourished low-income population, was implemented in April, 1980.

2. A longitudinal study on health and nutrition had been in progress in coffee plantations of Western Guatemala from October, 1977 and continued until February 1981. Data on children's growth, for communities (plantations) exposed to the increase in wages are available for

periods prior to the increase in the minimum wage and for 12 months after the increase in wage was effective. The same type of data are also available, for the same period prior of the increase in wages in coffee plantations, for neighboring subsistence farming communities not being affected to an increase in their total family income.

Thus, the opportunity existed to address whether an increase in minimum wages, which has improved the purchasing power of poor families, will reflect an impact, in the short (12 months) and medium term (around 48 months), on children's growth.

IV. RESEARCH OBJECTIVE AND HYPOTHESES

This investigation pursues the following research objective and hypotheses:

A. Objective

To document, whether or not, in the first and fourth year following an increase in minimum wage to labourers residing in coffee plantations located in Western Guatemala, there are identifiable improvements in their children's growth pattern.

B. Hypotheses

1. There are measurable changes in children's growth as a result of the increase in minimum wages, one year after the increment was effective.

2. The initial improvements in children's growth are maintained four years after the increases in wages were effective.

3. The nutritional impacts of improvements in minimum wages are larger in those plantations with a primary health care program.

V. ACTIVITIES CARRIED OUT WITH PRESENT FUNDING

The activities conducted with the present funding support, oriented to address the proposed research objectives and hypotheses, were divided in four phases which are now described.

A. Phase One: Identification of existing data files

Existing anthropometric data available at INCAP from the coffee plantations were identified and prepared for analyses during the first two months since the grant was initiated. Table 1 summarizes the number of children measured in weight and height in cross-sectional surveys conducted from November 1979 to February 1981 in six plantations denominated Opaque-2 corn and control plantations, participating in the Patulul Project (see Section VI), in seven plantations called super control in the same Project and in four subsistence communities located in Lake Atitlan; an area nearby to the 13 coffee plantations which were studied in the Patulul Project. These four subsistence communities served, in this investigation, as controls for the medium term nutritional impacts since the increment in wages in the coffee plantations did not exert any change in their total income.

B. Phase Two: Planning the collection of new data

This activity was completed as of June 1984. It entailed the training of field personnel, preparation and testing of questionnaires, standardization of field data collection procedures and the organization of the logistics for data collection in 6 plantations included in the Patulul Project *, 7 nearby plantations who served as super controls in the Patulul Project, and of the 4 subsistence communities located in Lake Atitlan.

C. Phase Three: Data collection

Anthropometric data were collected from July to October 1984 in 17 coffee plantations of the Patulul area and in the 4 subsistence communities located in Lake Atitlan. A total of 3,926 families were visited and anthropometric measurements (weight and height) were collected in 4,500 children less than 60 months of age. A total of 2,621 weights and heights of children under 60 months were utilized for the anthropometric analyses of the coffee plantations and of the four subsistence communities used in this report.

D. Phase Four: Data entry, analyses and preparation of a report

Phase four was carried out from January to June 1985. It entailed the review of questionnaires containing the data collected in 1984, entry and editing of new data and the integration of files containing

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* For the data collection, the ten plantations participating in the Patulul Project were visited and new anthropometric data were gathered in children in 1984. For analytical purposes, as to be described in following section, only the data from six plantations included in the Patulul Project were used.

the information gathered in 1984 with the data set available for the plantations and for the4subsistence communities from 1979 to 1981. The analytical plan and the final analyses were laid out and runned in this phase as well as the preparation of this report.

VI. MATERIALS AND METHODS

A. Design Features

The design used to address the proposed research objective and hypotheses resembles that of a quasiexperimental one. No communities or units of observations were assigned at random to treatments (i.e. the increase in wages). The design makes a before (November 1979 - April 1980) and during (February 1981 and September 1984) treatment (i.e., increases in wages) comparison of children's growth characteristics in 13 experimental communities (coffee plantations) exhibiting the increment in wages. The 13 experimental communities (coffee plantations) were subdivided in the following three groups, according to their exposure to other different treatments, before, during and after the increment in wages which took place as part of the Patulul Project. These experimental groups are:

1. Group 1 (Opaque-2; medical care and increase in wages)

These were three plantations (Moca, El Potosi and Santa Adelaida) who had medical care at least for 24 months before the increase in wages were effective. Santa Adelaida and Moca had had an effective medical care program operating since 1977. Around eight months before the increment in wages (10/01/79) these 3 plantations were provided with

a high protein quality corn denominated Opaque-2. This intervention continued during 10 more months (February 1981) after the increase in wages became effective. The medical care program continued in Santa Adelaida and Moca after February 1981. These three plantations were called, in the Patulul Project, the Opaque-2 corn plantations.

2. Group 2 (Medical care and wages)

Those were three coffee plantations (La Patria, California and Luisiana) who had a medical care program for at least 18 months before the increase in wages was effective. La Patria had had the medical care program since 1977 and continued with medical care after 1981. California and Luisiana provided, after 1981, a traditional medical care service to its residents. These three plantations did not receive, as part of the Patulul Project, Opaque-2 corn or any other food interventions but only medical care as it was also the case of Moca, Santa Adelaida and El Potosi. They were denominated, in the Patulul Project, as control communities.

3. Group 3 (wages)

These are a group of seven neighbors coffee plantations to the ones participating in the Patulul Project. They never received any food intervention from 1979 to 1981 neither there was any evidence that they had received any special or efficient medical care program from 1977 to 1984. Thus, the term "super-control" was given by the Patulul staff to differentiate them from the "control plantations" who received medical care but not a food intervention .

4. Subsistence farming communities

Besides the three subsets of experimental communities above described participating in the Patulul Project, all who exhibited an increment in wages in 1980, a fourth group of communities has been incorporated to the present research design. Those are four subsistence communities located in Lake Atitlan, nearby the Patulul area, who were not influenced in their incomes by the increases in minimum wages in coffee plantations. These four subsistence communities were studied by INCAP since 1977. A medical care program, resembling that implemented in the Patulul plantations (Opaque-2 and control groups), was in operation from 1975 to 1978. After 1978, the health services have been operating under the responsibility of the Ministry of Health. Anthropometric data (weight and height), gathered during household visits, were available for the year of 1979-1980 in children 0 to 60 months of age.

B. Description of data available and methods for collecting additional information

Table 1 summarizes, for each of the four groups of communities studied to address the research objective and hypotheses, the cross-sectional anthropometric data available for children 0 to 60 months. Table 1 also contains the information on the date of data collection from 1979 to 1981 for the children studied in each cross-sectional round of data collection. The data were edited using the following criteria for eliminating cases from the final analyses.

1. Children above 60 months of age or with missing age information.

2. Children with missing information on sex.

3. Children above and below 6 Standard Deviations of the median value of the National Center for Health Statistics (NCHS) reference population (54).

4. Children with missing information to elaborate at least, one anthropometric indicator (age, sex, weight, height).

For certain analyses, the data were divided, in two age groups (children from 0 to 24 months and from 25 to 60 months).

The information was classified for categorical analyses in the following different categories of Z-scores for each anthropometric measurement. Comparisons were made on the percentage of children in different groups (treatments) and periods (before, one and four years after the increase in wages) below -3 Standard Deviations (SD) and below -2 SD .

1. Above + 1.00 SD
2. From + 0.99 SD to 0.00 SD
3. From - 0.01 SD to -0.99 SD
4. From - 1.00 SD to -1.99 SD
5. From - 2.00 SD to -2.99 SD
6. Less than -3.00 SD

From July to October 1984 a total of 21 communities (17 coffee plantations and 4 subsistence communties) were visited by INCAP field team. Anthropometric measurements were collected, under standardized data collection procedures published elsewhere (55) in all children 0 to 60 months of age residing in the community. Weights were collected in a spring scale (Salter weighing equipment) with a total capacity of 25 kg and intervals of 0.1 kg. A wooden infantometer was used to measure length in children below 36 months and height in those aged 36 to 60 months. Length and height were measured to the nearest 0.1 cm. Birthdates of children were checked in most cases with documents provided by the civil registers (birth certificates). The data thus collected were edited following the same procedures described for that available at INCAP from the same communities prior to 1984. The same criteria were used for identifying cases out of expected range values or for discarding, from the final analysis, those children with missing data. The information was arranged, for analytical purposes, using the categories of Z-score for weight, length, height and weight for length and weight for height already described.

C. Analytical contrasts and approaches

Basic comparisons were made on changes in nutritional conditions of children studied in coffee plantations before and in early 1980 (1979-1980), in February 1981 and in June-September 1984. For medium term nutritional impacts, the changes in nutritional conditions existing in coffee plantations from 1979 to 1984 were contrasted with the magnitude of nutritional changes occurring in the four subsistence communities during the period 1979 to 1984.

The anthropometric data from the 13 coffee plantations were further subdivided in three groups of communities according to the initial treatments received in the original Patulul Project (Opaque-2, control and supercontrol). Thus, the interventions (independent variables) received by the different groups of communities can be classified as follows:

1. Group One (3 communities) = Increase in wages + medical care + Opaque-2 corn

2. Group Two (3 communities) = Increase in wages + medical care

3. Group Three (7 communities)= Increase in wages

4. Group Four (4 communities) = Medical care

The dependent variables (length, height, and weight for height) were expressed as continuous variables ($\bar{X} \pm$ SD of Z-score for weight and height values). In the latter analytical approach, the hypothesis of medium term impacts (4 years) was addressed using an experimental design with factorial arrangements using 2 time-periods (1979-1980; 1984) times 4 type of communities (groups 1, 2, 3, 4). For addressing the short term effects (one year) an experimental design, with factorial arrangements using 2 time periods (1979-1980; 1981) times 3 type of communities (groups 1, 2 and 3) was used. With the above design, analyses of covariance were

conducted, correcting the anthropometric data using age as a covariate within each cross-sectional survey. The median square errors were used to test the specific hypotheses, related to the impacts of increases in wages proposed in Section IV.

VI. RESULTS

The presentation of the results derived from this investigation, as related to the research objective and hypotheses, have been divided in short (one year) and medium term (4 years) effects of increases in minimum wages on children's growth. The potential differential impacts of the increase in minimum wages on children's growth, as a result of the presence of a medical care program, are addressed in each section dealing with short and medium term impacts.

A. Short-term effects of increases in wages on children's growth

The information related to the impacts of an increase in minimum wages on the growth pattern of children 0 to 60 months of age is presented, for continuous and categorical analyses, in Tables 2-13. The same type of analyses, for children below and above 24 months, are shown in Tables 14 to 19.

Table 2 presents the information on age adjusted means and standard deviations ($\bar{X} \pm SD$) of Z-scores values of weight observed in the groups of coffee plantations, exposed to the increase in wages. Group three of plantations denominated "Wages", as explained in Table 2 and in preceding sections, did not have a medical care program (PHCP). Children in all three groups of plantations show an important improvement in Z-score values

of weight one year after the increase in wages took place. As reflected in the last column, summarizing the change between the two study periods, the most important improvements in Z-score values of weight are observed in the two groups of plantations with a medical care program (groups 1 and 2) as compared to the third group exhibiting only an increase in wages ($P < 0.001$). The magnitude of the change in Z-score values of weight for groups 1 and 2 is slightly below 0.50 SD.

Table 3 displays the information of age adjusted means of Z-score values of height for the same group of children studied before and one year after the increase in wages were effective in the three type of plantations. Again, the improvements on growth are seen in the three groups of plantations between the period before and one year after the increase in wages ($P < 0.001$). The improvements in Z-score values of weight for height in the plantations with no medical care are more important than those observed in the two groups of plantations with a medical care program. The differences in changes of Z-score values of height among treatments are significant ($P < 0.05$).

The information related to changes of age adjusted means of Z-score values of weight for height, before and one year after the increase in wages was effective, is shown in Table 4. The differences between periods is statistically significant ($P < 0.001$). As expected from the previous results of changes of Z-score values of weight and height, marked improvements are detected in plantations with medical care: a positive change of 0.38 and 0.36 SD in groups 1 and 2 respectively. A slight deterioration, a negative change of -0.02, is observed in the plantations with no medical care. The differences among treatments are slightly

significant ($P \leq 0.10$). Tables 6 to 8 summarize the major features of the analyses of covariance carried out for the information on anthropometric changes before and one year after wages were improved which has been summarized in Tables 3 to 5 and already discussed.

The short term effects of the increases in minimum wages on children's growth were also addressed using categorical analyses. Thus, the nutritional impacts of improvements in wages in the lower tail of the distribution of nutritional status of children with regards to weight, height and weight for height were explored.

The percentage of children less than 60 months in age with Z-score values of weight below -3 SD is shown in Table 8. The overall prevalence before the increase in wages was 10.9% while a year after the improvements in family income were effective it was reduced to 7.5%; that is to say a decrease of 31% with respect to the initial prevalence. While in the group of plantations with no medical care the observed prevalence of children below -3 SD, before and one year after the increase in wages is very similar (10.4 and 10.8% respectively) in the plantations with improved wages plus medical care and Opaque-2 corn the reduction of the initial prevalence is of the order of 57% and that observed in the group of plantations with medical care, 62%. The information from the same group of children, when the critical cut-off point of nutritional status of <-2 S.D. of Z-score for weight was taken, is shown in Table 9. The initial prevalence of 43.9% decreases to 33.4%, that is to say 24% of the initial value. The declining trend in the proportion of children with malnutrition in all three groups of plantations when <-2 S.D. is used as

the cut-off point, is similar in all plantations. However, the magnitude of the declines are larger in plantations included in groups 1 and 2 both with a medical care program.

The information on the prevalence of children below -3 S.D. and -2 S.D. of height for the three groups of plantations are presented in Tables 10 and 11 respectively. As expected, due to the characteristic of this indicator, the magnitude of the reduction of the initial prevalence are less dramatic than in weight. However, when the cut-off point of $\leq$ 3 S.D. is used the same trend of a decline in malnutrition is observed in the three types of plantations and the overall reduction is of 3%. In the case of children below 2 S.D., the prevalences observed in all three groups of plantations combined before and one year after the increase in wages were effective, are similar (73.9%). While in Group 1 a slight increase after the improvement in wages is observed, the trend detected in groups 2 and 3 are towards a reduction in the proportion of children below -2 S.D.

Tables 12 and 13 summarize the analyses for prevalences of children below - 2 S.D. and below - 3 S.D. of Z-score of weight for height. The changes observed in weight for height reflect, to a large extent, those already described for the age dependent indicators. Thus, while in groups 1 and 2 of plantations with medical care the improvements observed are large, in the case of the plantations with no medical care of group 3, where improvements in height were more noticeable than those in weight, the trends observed in Tables 12 and 13 are towards an increment, one year after the wages were improved, in the initial prevalence of children below -2 and below -3 S.D. of weight for height.

The information, exploring the short term effects of changes in minimum wages in Z-score values of weight, height and weight for height, for the same group of children but divided this time in two age groups are presented in Tables 14 to 19. As the separation of the cohorts of children in two age groups. controls, to a large extent, for the slight differences in age observed in the entire cohorts aged 0 to 60 months, and the comparisons of ages with subgroups (0-24 and 24 and more months) and treatments do not show age differences among subgroups, the means of Z-score values to be described are not adjusted by age as a covariate.

The information of Z-score values of weight, for children $\leq$24 and >24 months of age is shown in Tables 14 and 15. The improvements in small children ($\leq$ 24 months) are dramatic in the groups of plantations 1 and 2 with medical care; 0.54 and 0.71 S.D., respectively. In the group of children from plantations where only the increases in wages took place, a slight deterioration of -0.13 S.D. of weight was observed.

In older children, as reflected in Table 15, the three groups of plantations showed improvements in Z-score values of weight. In contrast with the information derived from small children the most important improvements are seen, in the score values of weight for older children in group 3 (0.38 S.D.), group 1 (0.26 S.D.) and finally in group 2 (0.16 S.D.).

The information of Z-score values of heights, before and after the increase in wages divided by age groups, is presented in Tables 16 and 17. In general, there are improvements in all three groups of plantations in all three groups of plantations both in older and smaller

children. However, the magnitude of the observed improvements is larger in older than in smaller children. The exception are the children in group 2 of plantations, which followed the same pattern of larger improvements at younger ages observed in Z-scores of weight.

The information on Z-score values of weight for length, before and one year after the increase in wages is shown in Tables 18 and 19. The magnitude of the improvements in weight for height in children residing in those plantations with a medical care program is larger at younger ages. In the coffee plantations conforming group 3, the mean Z-score value of weight for height in younger children decreases from + 0.16 S.D. before the increment in wages, to - 0.19 S.D. one year after the wages were improved. In older children, the Z-score values of weight for height changes from -0.12 S.D. to + 0.11 S.D. during the same period.

B. Medium-term effects of increases in wages on children's growth

Table 20 to 35 summarize the information related to medium-term (four years) effects of increases in minimum wages on children's growth in the same three groups of coffee plantations used to address the short term (one year) impacts, and a fourth group of communities, used as controls, who were not exposed to an increment in their incomes during the study period.

The age adjusted mean values for Z scores of weight in children 0 to 60 months, for the period before and four years after the increase in wages were effective,are presented in Table 20. In the three groups of plantations there are improvements in children's weights four

years after the increase in wages were effective. In the case of the four subsistence agricultural villages, used as controls, the change in Z-score values of weight, between baseline and the evaluation carried out in 1984, is slightly negative (-0.03 S.D.). The differences among treatments (communities) are highly significant ($P < 0.001$) and those between periods (before and four years after wages were improved) is also significant ($P < 0.05$).

The information on changes in Z-score values of height before and four years after the increase in wages is presented in Table 21. There are improvements of the order of 0.25, 0.10 and 0.21 S.D. for the groups of plantations 1, 2 and 3 while in the case of the 4 control subsistence agricultural communities the situation deteriorated in the study period as the change in Z-scores of heights observed between 1980 and 1984 is negative (-0.20 S.D.). The differences among treatments are highly significant ($P < 0.001$) and the differences between periods slightly significant ($P < 0.10$).

The information on changes in Z-scores of weight for height is shown in Table 22. There is not a clear pattern of medium-term changes in Z-scores of weight for height among the plantations. The change observed in plantations conforming groups 1 and 3 are negative; - 0.01 S.D. and - 0.05 S.D., respectively. Conversely the change in group 2 of plantations is positive, + 0.13 S.D. as well as in the four subsistence agricultural communities, + 0.08 S.D. The differences among treatments and periods are not significant ($P > 0.05$). Tables 23 to 25 summarize the results of the analyses of covariance for the information contained in Tables 20 to 22 already described.

The same anthropometric information, from the periods before and four years after the increases in wages were effected is presented as prevalences of children below -3 S.D and below - 2 S.D. of Z-scores for weight, for height, and for weight for height in Tables 26 to 31. As reflected in Table 26 the overall change in the proportion of children below -3 S.D., when baseline data are compared with that four years after the increase in wages, show that in coffee plantations the prevalence was reduced from 10.9% to 7.4%, that is to say a decrease of the order of 32%. On the other hand, the prevalences of children below -3 S.D. observed in the four subsistence communities are very similar; 16.2% in 1980 and 16.3% in 1984. When the same information, as presented in Table 27, is analyzed using as a cut-off point <-2 S.D., there is an overall decrease for all plantations of 3.6% in the prevalence while in the case of the 4 control subsistence communities the magnitude of the changes is similar but in the opposite direction, negative, suggesting a deterioration in the nutritional status of the four subsistence communities during the study period. It is important to single out that the overall change for all plantations is consistent for each of the three groups of coffee farms.

Tables 28 and 29 summarize the information on the prevalences of height retardation before and 4 years after the increase in wages using as cut-off points - 3 S.D. and - 2 S.D. respectively. The overall decrease in the prevalence of children below -3 S.D. in the three type of plantations combined is 4.7% while in the 4 subsistence communities the trend is towards a deterioration as the prevalence observed in 1984 is 6.4% higher than that detected in 1980. The magnitude of the changes, when <-2 S.D. is used as a cut off point, are of lesser importance than when

<- 3 S.D. is utilized. Thus, the improvements in the proportion of children below - 2 S.D. in the plantations of the order of 1.4% and the deterioration of the prevalence of children below -2 S.D. in the subsistence agricultural communities between 1980 and 1984 is 3.2%. It is important to observe, when the information of short and medium-term changes in height retardation contained in Tables 10 and 28 are compared, that the magnitude of changes in the coffee plantations are larger for the medium (1980-1984) than for the short term (1980-1981).

The information for weight for height, which is explained by the changes observed in the age dependent indicators as Z-score of weight and of height, is presented in Tables 30 and 31. The changes in the prevalences of children below - 3 S.D., shown in Table 30, are negative in the groups of coffee plantations and in the four subsistence communities. The same pattern is observed in Table 31 when <-2.00 S.D. is used as a critical cut-off point in scores of weight for height.

Tables 32 and 33 present the means and standard deviations of Z scores values of weight for children ≥ 24 and < 24 months of age, respectively before and four years after the increase in wages were effective. In small children, all experimental groups show an improvement in Z-score values for weight which ranged from 0.03 in group 3 to 0...8 S.D. in group 2. The estimated overall mean change for all plantations combined is slightly lower (around 0.13 S.D.) than the change observed in the four control subsistence agricultural communities. However, a different pattern emerged in the case of older children since in the three groups of coffee plantations the change is positive (0.14 S.D. in groups 1 and 3 and 0.03

in group 2), while in the four subsistence villages there is a noticeable deterioration (-0.15 S.D.) of score values of weight.

In the case of Z-scores of height, as reflected in Table 34, the improvements in young children are not very large either in the three groups of coffee plantations or in the 4 subsistence communities. However, in older children the changes between 1980 and 1984 in Z score values of height in the group of plantations 3 and 1 are of the order of 0.31 and 0.34 S.D., respectively. The smaller change in Z score values of height in older children living in coffee plantations is seen in Group 2. In the four subsistence agricultural communities, a serious deterioration in Z-score values of height is seen in 1984 as the difference between the 1980 and 1984 in means is -0.34 S.D.

Tables 36 and 37 show the information related to weight for height for younger and older children respectively. In the case of older children the improvements in height are larger than those in weight in the three groups of coffee plantations; therefore the changes in weight for height are slighly negative. Conversely, as reflected in Table 37, as the deterioration in Z-score values of height was larger than that observed in weight in older children from the four subsistence communities there is a slight improvement in their weight for height between 1980 and 1984.

VII. DISCUSSION

The analyses conducted, on the short and medium term anthropometric effects of increases in minimum wages in coffee plantations located in

Western Guatemala, have shown several clear cut results while others may deserve further discussion.

Firstly, the anthropometric information from the three groups of coffee plantations who were studied before and one year after the increase in minimum wages show conclusively that marked short-term anthropometric improvements occurred on children's growth during the study period. In the two groups of plantations where an efficient medical care program, run by INCAP staff, was operating a better and more harmonic growth in weight and in height was observed. Thus the cohort of children studied in 1981 were heavier, taller and with a better weight for height relationship. In the group of plantations exhibiting an increase in wages, but not a PHCP, there was also a noticeable impact in height, the gain in weight was smaller and therefore the weight for height relationship decreased in the children studied in 1981 as compared to the children studied in 1980. The magnitude of the changes in the tail of the distribution of children with worst nutritional conditions, particularly in weight and to a certain extent in height ($\leq$ -3 S.D.) in the two groups of plantations with medical care, when the data are expressed as prevalences below $<$ - 2 S.D. or $<$- 3 S.D., should not be overlooked and are of paramount biological and public health importance.

Several salient points emerged in the analyses of the anthropometric data collected in 1980 and 1981 by age groups. First, the changes in weight are more marked in small ($\leq$ 24 months) than in older children ($>$ 24 months). Furthermore, this is only observed in children from plantations with PHCP (0.71 and 0.60 S.D. in groups 1 and 2 respectively) since in the children

from plantations with no PHCP there is a slight deterioration in Z score values of weight (-0.13 S.D.) between 1980 and 1981 in older children.

The changes in Z score values of weight are of lesser magnitude in older children in all three type of plantations. Furthermore, as opposed to the situation observed in younger children, the group of plantations with no medical care exhibit the larger increment in Z-score values of weight observed in all three type of plantations.

With respect to Z score values of height, all groups of plantations present improvements one year after their wages were raised. In younger children these gains in height were more modest than in older children. In conclusion, one year after the improvements in wages the gains in children's weight were very important and those in height were also positive but of lesser magnitude. The presence of a medical care program certainly enhanced those gains particularly in changes in weight in small children.

The changes in anthropometric indicators, four years after the increase in wages, show differences among treatments in weight and particularly in height, and between periods for weight ($P < 0.05$) and, to a lesser extent for height ($P < 0.10$). The use of prevalences of children below - 3 S.D. and below - 2 S.D. confirm the results above described. Thus, the reduction in the prevalence of severe weight retardation (< - 3 S.D.) is of the order of 3% in coffee plantations while in the four subsistence control communities it increases by a similar percentage. However, with respect to heights, the magnitude of the differences between the prevalences of children below - 3 S.D. observed in the groups of coffee

plantations and in the four subsistence villages are much larger. When the data are separated by age groups, the small children exhibit a similar pattern of changes four years after the increase in wages than that described for the entire group of children (0 to 60 months). However, in older children the positive changes in the reduction of height retardation detected in the plantations are much larger than in small children while in the older children from the four subsistence communities a marked deterioration in the nutritional status from 1980 to 1984 is observed. In conclusion, four years after the increase in wages the changes in height are more important than in weight and are better reflected in older (more than 24 months) than in small children. Furthermore, the anthropometric changes between 1980 and 1984 by groups of plantations (with and without medical care) are not different.

The results derived from the comparison of the anthropometric changes observed in the first and fourth year after the minimum wages were improved deserve further discussion. One may expect that the short term effects on a given intervention will be, as occurred in this investigation, better reflected in Z-score values of weight or in Z-score values of weight/height and, to a lesser extent, in Z-score values of height. Furthermore, it is expected that improvements are to be better reflected in younger than in older children. It follows that in the medium term, one would expect that such short term improvements wil be definitely reflected in better attained values of heights in both small and older children if the effects of the intervention under analyses are persistent over the observed period of time. While the changes in height in children from the coffee plantations are important four years (1980-1984) after the increase in wages were effected,

it is not consistent across ages as in small children improvements observed in the short term (1980-1981) are not maintained , for younger children, although they are much larger in older children. Therefore, the data suggest that the cohort of children less than 24 months who were measured one year after the improvements in wages were effected maintained their better nutritional status as they grew older and they became an important proportion of the cohort above 24 months included in the analyses carried out for anthropometric changes four years after the improvements in wages. Thus, the effects at four years are mostly explained by anthropometric improvements observed in older children which were, in fact, already present one year after the wages were increased in 1981.

The observed short and medium term anthropometric effects already described should be analyzed taken into account the following factors. Firstly, sample sizes usually work favorably to ascribe nutritional impacts to almost any differences among groups as sample sizes are rather large. Thus, besides looking at the statistical meaning of the differences, one should also analyze the biological and functional consequences of the observed differences in anthropometric measurements. Another point requiring further explanation is that the children studied in the four subsistence communities in 1979-1980 were a random sample of children from the total universe (50%) and not the result of total enumeration as were the case in the plantations in 1980, 1981 and 1984 or, in the same four subsistence agricultural communities in 1984. However, the latter situation should not affect at all the inferences already made about changes in nutritional status over periods of time as the sample study in the subsistence communities in 1979-1980 was selected at random.

The following issues, however, should be taken into account in interpreting the data already described. Firstly, after 1981 the medical care program provided by INCAP in the groups one and two of coffee plantations were taken over by a private foundtaion. There is not full guarantee, as it is also the case in the 4 subsistence villages, that the quality of the medical care services provided by INCAP was maintained in all communities by the private foundation or by the Ministry of Health. Furthermore, after 1981 some coffee plantations of Western Guatemala* cut the subsidies to corn, wood, housing. The economic value of such services, provided at low cost or free before 1981, were discounted from the minimum wage approved in 1980. Thus, the initial increase in wages from Q1.08 per day to Q3.20 was reduced after 1981 in many plantations to Q1.70. Furthermore, less labour opportunities were available for women and older children in the off season period. The latter was a response of the owners of the coffee plantations to reduce the increment in their total payrolls derived from the sudden increase in minimum wage.

Other issues which sould be bear in mind, in interpreting these results are the following. Rapid changes in infant and 1 to 4 year old mortality rates during the same periods should be explored to determine whether the changes in wages exerted any effect in mortality rates and the potential effect of changes in mortality rates in anthropometric changes. Haaga et al (56) have suggested that such potential impacts in decreasing mortality are of not great importance in interpreting changes in growth data but our data have to be analyzed to determine if that assumption is

*The authors are not implying that such measures were taken in the coffee plantations participating in the study as the extent and magnitude of such reductions wer3 not addressed by the present investigation.

also valid in these coffee plantations. Furthermore, a cross-sectional investigation cannot control properly by out and in migration patterns in the study periods and for the potential bias that such factors can introduce in the inferences to be made on the data analyzing anthropometric changes in communities over periods of time. Thus, the effect of migration patterns is of particular concern in interpreting the medium term anthropometric impacts already discussed.

Finally, one has to conclude that malnutrition is widespread in the study communities and that even when important improvements were seen in the short term they still reflect poor living conditions and a lack of fulfullment of basic needs. The question that remains unanswered is what would have been the magnitude of anthropometric changes that would have occurred if the medical care program, the purchasing power of families and interventions gear to improve environmental sanitation and housing conditions would have been maintained and/or properly carried out four years after wages were improved. Countries where such social policies have been initiated and properly implemented and supervised, as in Costa Rica, (57-58), have shown in the short and medium term, dramatic improvements in mortality rates and in the growth pattern of children from the most deprived, traditionally neglected, families from rural areas.

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Table 1

WEIGHT AND HEIGHT DATA AVAILABLE (NUMBER OF CASES) FROM CHILDREN 0 TO 60 MONTHS OF AGE FOR THE PERIODS PRIOR TO ONE YEAR AND FOUR YEARS AFTER THE WAGES WERE INCREASED IN COFFEE PLANTATIONS OF WESTERN GUATEMALA AND IN FOUR SUBSISTENCE VILLAGES LOCATED IN LAKE ATITLAN 1979-1984**

Groups and number of communities	Before the intervention* Nov. 1979-Apr. 1980	One year after the intervention* (Feb. 1981)	Four years after the intervention* (July-Nov. 1984)
1. Opaque 2, wages and medical care (3 communities)	423	324	431
2. Wages and medical care (3 communities)	308	291	417
3. Wages (7 communities)	435	525	624
4. Medical care (4 communities)	654	**	1149

* It refers to the increase in minimum wages

** No data were collected in these four communities in February 1981

TABLE 2

AGE ADJUSTED MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D) OF Z-SCORES VALUES OF WEIGHT IN CHILDREN LESS THAN 60 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA 1979-1980 AND 1981

Groups (1-3)	Z-score values*		Change
	Before increase ($\bar{X} \pm$ S.D.)	After increase ($\bar{X} \pm$ S.D.)	
1. OP_2+PHCP+Wages	-1.87 $\pm$ 1.05	-1.48 $\pm$ 1.05	+0.49
2. PHCP + Wages	-1.74 $\pm$ 0.96	-1.33 $\pm$ 1.10	+0.41
3. Wages	-1.74 $\pm$ 1.15	-1.57 $\pm$ 1.19	+0.17

1. Opaque 2 corn (OP_2) + Primary health care (PHCP) + Increase in wages (Wages)
2. Primary health care program (PHCP) + Increase in wages (Wages)
3. Increase in wages (Wages)

* See sample sizes in Table 1.

TABLE 3

AGE ADJUSTED MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF HEIGHT IN CHILDREN LESS THAN 60 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA. 1979-1980 AND 1981.

Groups*	Z-score values		Change
	Before increase ($\bar{X} \pm$ S.D.)	After increase ($\bar{X} \pm$ S.D.)	
1. OP_2+PHCP+Wages	-2.98 $\pm$ 1.29	-2.78 $\pm$ 1.20	+0.20
2. PHCP + Wages	-2.64 $\pm$ 1.31	-2.44 $\pm$ 1.44	+0.20
3. Wages	-2.82 $\pm$ 1.44	-2.55 $\pm$ 1.45	+0.27

1. Opaque 2 corn (OP_2) + Primary health care program (PHCP) + Increase in wages (Wages)

2. Primary health care program (PHCP) + Increase in wages (Wages)

3. Increase in wages (Wages)

TABLE 4

AGE ADJUSTED MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF WEIGHT FOR HEIGHT IN CHILDREN LESS THAN 60 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA 1979-80 & 1981

Groups*	Z- score values		Change
	Before increase ($\bar{X} \pm$ S.D.)	After increase ($\bar{X} \pm$ S.D.)	
1. OP_2+PHCP+Wages	-0.06 $\pm$ 0.96	+0.32 $\pm$ 1.10	+0.38
2. PHCP + wages	-0.15 $\pm$ 1.00	+0.21 $\pm$ 1.04	+0.36
3. Wages	-0.00 $\pm$ 1.11	-0.02 $\pm$ 1.20	-0.02

*

1. Opaque 2 corn (OP_2) + Primary health care program (PHCP) + Increase in wages (Wages)
2. Primary health care program (PHCP) + Increase in wages (Wages)
3. Increase in wages (Wages)

Table 5

ANALYSES OF COVARIANCE FOR Z-SCORE VALUES OF HEIGHT OF CHILDREN BELOW 60 MONTHS OF AGE OBSERVED IN DIFFERENT COMMUNITIES BEFORE AND ONE YEAR AFTER THE INCREASE IN WAGES WAS EFFECTIVE. COFFEE PLANTATIOS OF WESTERN GUATEMALA 1979-1980 AND 1981

Source	Sum of squares	Degrees of freedom	Mean square	F	P
Age	712.15	1	712.15	459.34	0.000
Treatments	34.98	2	17.49	11.28	0.000
Periods	22.42	1	22.42	14.46	0.000
Treatments & Periods	0.78	2	0.39	0.25	0.778
Error	3260.44	2103	1.55		

Table 6

ANALYSES OF COVARIANCE FOR Z-SCORE VALUES OF WEIGHT OF CHILDREN 0 TO 60 MONTHS OF AGE OBSERVED IN DIFFERENT COMMUNITIES BEFORE AND ONE YEAR AFTER THE INCREASE IN WAGES WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA 1979-1980 AND 1981

Source	Sum of squares	Degrees of freedom	Mean square	F	P
Age	165.35	1	165.35	145.15	0.000
Treatments	7.14	2	3.57	3.14	0.044
Periods	51.02	1	51.02	44.79	0.000
Treatment & Periods	7.14	2	3.57	3.13	0.044
Error	2395.56	2103	1.14		

Table 7

ANALYSES OF COVARIANCE FOR Z-SCORE VALUES OF WEIGHT FOR HEIGHT OF CHILDREN 0 TO 60 MONTHS OF AGE OBSERVED IN DIFFERENT COMMUNITIES BEFORE AND ONE YEAR AFTER THE INCREASE IN WAGES WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA 1979-1980 AND 1981

Source	Sum of squares	Degrees of freedom	Mean square	F	P
Age	3.61	1	3.61	3.03	0.082
Treatments	6.80	2	3.40	2.86	0.058
Periods	27.84	1	27.84	23.38	0.000
Treatment & Periods	21.41	2	10.70	8.99	0.000
Error	2504.47	2103	1.19		

TABLE 8

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -3 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF WEIGHT BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980, 1981

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	12.4	5.3	-7.1
2. PHCP + Wages	10.1	3.8	-6.3
3. Wages	10.4	10.8	+0.4
TOTAL	10.9	7.5	-3.4

TABLE 9

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -2 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF WEIGHT BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980, 1981

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	48.7	34.4	-14.3
2. PHCP + Wages	40.2	28.7	-11.5
3. Wages	43.3	34.9	- 8.4
TOTAL	43.9	33.4	-10.5

TABLE 10

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -3 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF HEIGHT BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980, 1981

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	52.0	46.6	-5.4
2. PHCP + Wages	37.5	36.4	-1.1
3. Wages	45.4	41.2	-4.2
TOTAL	44.9	41.9	-3.0

TABLE 11

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -2 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF HEIGHT BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980, 1981

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	76.4	77.5	+0.9
2. PHCP + Wages	73.0	69.6	-3.4
3. Wages	73.0	72.5	-0.5
TOTAL	73.9	73.9	0.0

TABLE 12

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -3 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF W/F/H* BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980, 1981

Groups	Percentage of cases		Change
	Before increase	After increase	
1. CP_2 + PHCP+ Wages	0.4	0.0	-0.4
2. PHCP + Wages	0.7	0.0	-0.7
3. Wages	0.5	2.0	+1.5
TOTAL	0.5	0.9	+0.4

* Weight for Height.

TABLE 13

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -2 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF W/F/H* BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980, 1981

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+ PHCP+ Wages	1.8	0.3	-1.5
2. PHCP + Wages	3.7	1.7	-2.0
3. Wages	2.1	5.3	+3.2
TOTAL	2.5	3.0	+0.5

* Weight for Height

TABLE 14

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm SD$) OF Z-SCORE VALUES OF WEIGHT IN CHILDREN < 24 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE.
COFFEE PLANTATIONS OF WESTERN GUATEMALA.
1979-1980 AND 1981

Groups	Z-score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-1.60 ± 1.27 (118) *	-1.06 ± 1.18 (140)	+0.54
2. PHCP + Wages	-1.62 ± 1.13 (133)	-0.91 ± 1.38 (118)	+0.71
3. Wages	-1.40 ± 1.23 (213)	-1.53 ± 1.43 (221)	-0.13

( )* Sample sizes

TABLE 15

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF WEIGHT IN CHILDREN > 24 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE.
COFFEE PLANTATIONS OF WESTERN GUATEMALA.
1979-1980 AND 1981

Groups	Z-Score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-2.07 ± 0.80 (157)*	-1.82 ± 0.79 (180)	+0.26
2. PHCP + Wages	-1.81 ± 0.79 (163)	-1.65 ± 0.74 (165)	+0.16
3. Wages	-2.00 ± 0.98 (210)	-1.62 ± 0.97 (289)	+0.38

( ) * Sample sizes

TABLE 16

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF HEIGHT IN CHILDREN $\leq$ 24 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA. 1979-1980 AND 1981

Groups	Z-score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-2.45 $\pm$ 1.34 *	-2.36 $\pm$ 1.34	+0.09
2. PHCP + Wages	-2.10 $\pm$ 1.44	-1.85 $\pm$ 1.73	+0.25
3. Wages	-2.23 $\pm$ 1.37	-2.16 $\pm$ 1.61	+0.07

* See Table 14 for sample size.

TABLE 17

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF HEIGHT IN CHILDREN > 24 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980 AND 1981

Groups	Z-score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-3.36 $\pm$ 1.11 *	-3.15 $\pm$ 0.96	+0.21
2. PHCP + Wages	-3.02 $\pm$ 1.03	-2.89 $\pm$ 1.02	+0.13
3. Wages	-3.25 $\pm$ 1.32	-2.89 $\pm$ 1.23	+0.36

* See Table 15 for sample size.

TABLE 18

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF WEIGHT/HEIGHT IN CHILDREN < 24 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980 AND 1981

Groups	Z-score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	+0.02 $\pm$ 1.10 *	+0.67 $\pm$ 1.30	+0.65
2. PHCP + Wages	-0.31 $\pm$ 1.19	+0.40 $\pm$ 1.33	+0.71
3. Wages	+0.16 $\pm$ 1.34	-0.19 $\pm$ 1.50	-0.35

* See Table 14 for sample size.

TABLE 19

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF WEIGHT/HEIGHT IN CHILDREN > 24 MONTHS IN AGE BEFORE AND ONE YEAR AFTER AN INCREASE IN MINIMUM WAGE WAS EFFECTIVE
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1979-1980 AND 1981

Groups	Z-score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-0.12 $\pm$ 0.84 *	+0.05 $\pm$ 0.82	+0.27
2. PHCP + Wages	-0.02 $\pm$ 0.81	+0.08 $\pm$ 0.76	+0.10
3. Wages	-0.12 $\pm$ 0.80	+0.11 $\pm$ 0.90	+0.23

* See Table 15 for sample size.

TABLE 20

AGE ADJUSTED MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF WEIGHT IN CHILDREN LESS THAN 60 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AND INCREASE IN MINIMUM WAGE WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA AND FOUR SUBSISTENCE VILLAGES OF LAKE ATITLAN 1979-80 & 1984

Groups *	Z-score values		Change
	Before increase ($\bar{X} \pm$ S.D.)	After increase ($\bar{X} \pm$ S.D.)	
1. OP_2+PHCP+Wages	-1.87 $\pm$ 1.05	-1.75 $\pm$ 1.05	+0.12
2. PHCP + Wages	-1.74 $\pm$ 0.96	-1.56 $\pm$ 0.95	+0.18
3. Wages	-1.74 $\pm$ 1.15	-1.65 $\pm$ 1.98	+0.09
4. Control (PHCP)	-1.95 $\pm$ 1.13	-1.98 $\pm$ 1.17	-0.03

1. Opaque 2 corn (OP_2) + Primary health care program (PHCP) + Increase in wages (Wages)

2. Primary health care program (PHCP) + Increase in wages (Wages)

3. Increase in wages (Wages)

4. Four subsistence agricultural communities with a primary health care program (PHCP)

TABLE 21

AGE ADJUSTED MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF HEIGHT IN CHILDREN LESS THAN 60 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA AND FOUR SUBSISTENCE VILLAGES OF LAKE ATITLAN. 1979-1980 AND 1984

Groups *	Z-score values		Change
	Before increase ($\bar{X} \pm$ S.D.)	After increase ($\bar{X} \pm$ S.D.)	
1. OP_2+PHCP+Wages	-2.98 $\pm$ 1.29	-2.73 $\pm$ 1.35	+0.25
2. PHCP + Wages	-2.64 $\pm$ 1.31	-2.54 $\pm$ 1.18	+0.10
3. Wages	-2.82 $\pm$ 1.44	-2.61 $\pm$ 1.26	+0.21
4. Control (PHCP)	-3.08 $\pm$ 1.24	-3.26 $\pm$ 1.29	-0.20

1. Opaque 2 corn (OP_2) + Primary health care program (PHCP) + Increase in wages (Wages)
2. Primary health care program (PHCP) + Increase in wages (Wages)
3. Increase in wages (Wages)
4. Four subsistence agricultural communities with a primary health care program (PHCP)

TABLE 22

AGE ADJUSTED MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE VALUES OF WEIGHT FOR HEIGHT IN CHILDREN LESS THAN 60 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA AND FOUR SUBSISTENCE VILLAGES OF LAKE ATITLAN. 1979-1980 AND 1984

Groups	Z-score values		Change
	Before increase ($\bar{X} \pm$ S.D.)	After increase ($\bar{X} \pm$ S.D.)	
1. OP_2+ PHCP+ Wages	-0.06 $\pm$ 0.96	-0.07 $\pm$ 1.02	-0.01
2. PHCP + Wages	-0.15 $\pm$ 1.00	-0.02 $\pm$ 0.82	+0.13
3. Wages	0.00 $\pm$ 1.11	-0.05 $\pm$ 0.93	-0.05
4. Control (PHCP)	-0.08 $\pm$ 1.13	0.00 $\pm$ 1.05	+0.08

1. Opaque 2 corn (OP_2) + Primary health care program (PHCP) + Increase in wages (Wages)
2. Primary health care program (PHCP) + Increase in wages (Wages)
3. Increase in wages (Wages)
4. Four subsistence agricultural communities with primary health care program

TABLE 23

ANALYSES OF COVARIANCE FOR Z-SCORE OF WEIGHT OF CHILDREN BELOW 60 MONTHS OF AGE OBSERVED IN DIFFERENT COMMUNITIES BEFORE AND FOUR YEARS AFTER THE INCREASE IN WAGES WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN. 1979-1980 AND 1984

Source	Sum of squares	Degrees of freedom	Mean Square	F	P
Age	337.33	1	337.32	310.32	0.000
Treatments	51.40	3	17.13	15.76	0.000
Periods	6.15	1	6.15	5.7	0.018
Treatments & Periods	4.67	3	1.56	1.4	0.238
Error	4286.20	3943	1.09		

TABLE 24

ANALYSES OF COVARIANCE FOR Z-SCORE OF HEIGHT OF CHILDREN BELOW 60 MONTHS OF AGE OBSERVED IN DIFFERENT COMMUNITIES BEFORE AND FOUR YEARS AFTER THE INCREASE IN WAGES WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA AND FOUR RURAL SUB-SISTENCE COMMUNITIES OF LAKE ATITLAN 1979-1980 AND 1984

Source	Sum of squares	Degrees of freedom	Mean Square	F	P
Age	1169.44	1	1169.44	840.95	0.000
Treatments	130.80	3	43.60	31.35	0.000
Periods	4.03	1	4.03	2.90	0.089
Treatments & Periods	41.75	3	13.92	10.01	0.000
Error	5483.20	3943	1.391		

TABLE 25

ANALYSES OF COVARIANCE FOR Z-SCORE OF WEIGHT FOR HEIGHT OF CHILDREN BELOW 60 MONTHS OF AGE OBSERVED IN DIFFERENT COMMUNITIES BEFORE AND FOUR YEARS AFTER THE INCREASE IN WAGES WAS EFFECTIVE. COFFEE PLANTATIONS OF WESTERN GUATEMALA AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN 1979-1980 AND 1984

Source	Sum of squares	Degrees of freedom	Mean Square	F	P
Age	43.95	1	43.95	44.61	0.000
Treatments	2.03	3	0.68	0.69	0.559
Periods	2.54	1	2.54	2.57	0.109
Treatments & Periods	8.10	3	2.70	2.74	0.042
Error	3883.98	3943	0.98		

TABLE 26

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -3 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF WEIGHT BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN
1979-1980 & 1984

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	12.4	8.6	-3.8
2. PHCP + Wages	10.1	5.8	-4.3
3. Wages	10.4	7.7	-2.7
Total Plantations **	10.9	7.4	-3.5
4. Control (PHCP)	16.2	16.3	+0.1

* See Table 5

** Groups 1, 2 and 3 together

TABLE 27

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -2 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF WEIGHT BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN
1979-1980 & 1984

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	48.7	45.2	-3.5
2. PHCP + Wages	40.2	35.5	-4.7
3. Wages	43.3	40.1	-3.2
Total Plantations **	43.9	40.3	-3.6
4. Control (PHCP)	51.5	54.6	+3.1

* See Table 5

** Groups 1, 2 and 3 together

TABLE 28

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -3 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF HEIGHT BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN
1979-1980 & 1984

Groups *	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	52.0	43.2	-8.8
2. PHCP + Wages	37.5	39.6	+2.1
3. Wages	45.4	38.6	-6.8
Total plantations **	44.9	40.2	-4.7
4. Control (PHCP)	55.4	61.8	+6.4

* See Table 5

** Groups 1, 2 and 3

TABLE 29

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -2 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF HEIGHT BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN
1979-1980 & 1984

Groups *	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	76.4	76.6	+0.2
2. PHCP + Wages	73.0	71.2	-1.8
3. Wages	73.0	70.5	-2.5
Total plantations **	73.9	72.5	-1.5
4. Control (PHCP)	82.3	85.5	+3.2

* See Table 5

** Groups 1, 2 and 3 together

TABLE 30

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -3 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF W/F/H* BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN
1979-1980 & 1984

Groups **	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	0.4	0.7	+0.3
2. PHCP+Wages	0.7	0.2	-0.5
3. Wages	0.5	0.8	+0.3
Total plantations ***	0.5	0.6	+0.1
4. Control (PHCP)	1.2	0.4	-0.8

* Weight for height

** See Table 5

*** Groups 1, 2 and 3 together

TABLE 31

PERCENTAGE OF CHILDREN 0 TO 60 MONTHS OF AGE BELOW -2 STANDARD DEVIATIONS (S.D.) IN Z-SCORE OF W/F/H* BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES
COFFEE PLANTATIONS OF WESTERN GUATEMALA
AND FOUR RURAL SUBSISTENCE COMMUNITIES OF LAKE ATITLAN
1979-1980 & 1984

Groups	Percentage of cases		Change
	Before increase	After increase	
1. OP_2+PHCP+Wages	1.8	1.9	+0.1
2. PHCP+Wages	3.7	0.5	-3.2
3. Wages	2.1	1.3	-0.8
Total plantations ***	2.5	1.1	-1.4
4. Control (PHCP)	4.4	2.1	-2.3

* Weight for height

** See Table 5

*** Groups 1, 2 and 3 together

TABLE 32

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE OF WEIGHT IN CHILDREN ≤24 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA 1977-1980 & 1984

Groups	Z-Score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-1.60 ± 1.27 (115) *	-1.51 ± 1.25 (180)	+0.09
2. PHCP + Wages	-1.62 ± 1.13 (133)	-1.34 ± 1.12 (169)	+0.28
3. Wages	-1.40 ± 1.23 (213)	-1.37 ± 1.28 (280)	+0.03
4. Control (PHCP)	-1.75 ± 1.32 (273)	-1.61 ± 1.44 (476)	+0.14

* ( ) Sample size.

TABLE 33

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE OF WEIGHT IN CHILDREN > 24 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA 1977-1980 & 1984

Groups	Z-Score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-2.07 ± 0.80 (157) *	-1.93 ± 0.84 (251)	+0.14
2. PHCP + Wages	-1.81 ± 0.79 (163)	-1.78 ± 0.78 (248)	+0.03
3. Wages	-2.00 ± 0.98 (210)	1.86 ± 0.84 (344)	+0.14
4. Control (PHCP)	-2.10 ± 0.94 (381)	-2.25 ± 0.85 (673)	-0.15

* ( ) Sample size.

TABLE 34

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE OF HEIGHT II' CHILDREN ≤ 24 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE
COFFEE PLANTATIONS OF WESTERN GUATEMALA
1977-1980 & 1984

Groups	Z-Score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-2.45 ± 1.34	-2.35 ± 1.50	+0.10
2. PHCP + Wages	-2.10 ± 1.44	-2.08 ± 1.27	+0.02
3. Wages	-2.23 ± 1.37	-2.24 ± 1.34	-0.01
4. Control (PHCP)	-2.70 ± 1.33	-2.67 ± 1.44	+0.03

* See Table 32 for sample size

TABLE 35

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE OF HEIGHT IN CHILDREN > 24 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA 1977-1980 & 1984

Groups	Z-Score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-3.36 ± 1.11	-3.02 ± 1.16	+0.34
2. PHCP + Wages	-3.02 ± 1.03	-2.93 ± 0.98	+0.09
3. Wages	-3.25 ± 1.32	-2.89 ± 1.11	+0.36
4. Control (PHCP)	-3.34 ± 1.10	-3.68 ± 0.96	-0.34

* See Table 33 for sample size.

TABLE 36

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE OF WEIGHT/HEIGHT IN CHILDREN $\leq$ 24 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA 1977-1980 & 1984

Groups	Z-Score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	+0.02 $\pm$ 1.10 *	+0.07 $\pm$ 1.18	+0.05
2. PHCP + Wages	-0.31 $\pm$ 1.19	+0.02 $\pm$ 0.96	+0.33
3. Wages	+0.16 $\pm$ 1.34	+0.13 $\pm$ 1.05	-0.03
4. Control (PHCP)	+0.06 $\pm$ 1.34	+0.22 $\pm$ 1.24	+0.16

* See Table 32 for sample size.

TABLE 37

MEANS AND STANDARD DEVIATIONS ($\bar{X} \pm$ S.D.) OF Z-SCORE OF WEIGHT/HEIGHT IN CHILDREN > 24 MONTHS IN AGE BEFORE AND FOUR YEARS AFTER AN INCREASE IN MINIMUM WAGES WAS EFFECTIVE COFFEE PLANTATIONS OF WESTERN GUATEMALA 1977-1980 & 1984

Groups	Z-Score values		Change
	Before increase $\bar{X} \pm$ S.D.	After increase $\bar{X} \pm$ S.D.	
1. OP_2+PHCP+Wages	-0.12 ± 0.84 *	-0.18 ± 0.86	-0.06
2. PHCP + Wages	-0.02 ± 0.81	-0.07 ± 0.71	-0.05
3. Wages	-0.1 ± 0.80	-0.19 ± 0.80	-0.07
4. Control (PHCP)	-0.19 ± 0.94	-0.14 ± 0.86	+0.05

* See Table 33 for sample size.