A DIETARY SURVEY OF DOWNWARD INDIAN MIGRANTS AND LONG–TERM COASTAL RESIDENTS LIVING IN SOUTHERN COASTAL PERU[1]

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SUMMARY

This paper presents the results of a dietary survey conducted in three southern coastal Peruvian communities in the Valley of Tambo during July and August, 1971, which had as its primary objective the assessment of significant alterations in food consumption patterns of downward Indian migrants. Using a combination of weighing and recall inventory techniques, the amount and frequency of foods eaten during a determined period, seasonal variation, and qualitative changes of the diets of long-term coastal resident and downward Indian migrant families were obtained. Although the results of the survey are based on aggregate family figures and do not represent an attempt to evaluate individual nutritional status, certain conclusions can be drawn about the food consumption patterns of migrant and resident families. 1) Migrant dietary levels of calories and nutrients appear adequate when compared to ICNND standards, with the exception of vitamin A. 2) The diet of migrant families residing for two years or less at low

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altitude has lower calories and nutrient levels than total average migrant intakes. 3) The minimal retention of highland foodstuffs in the total food inventory and loss of particular attitudes towards foods suggests that consumption patterns change rapidly upon arrival to a new cultural and environmental setting. 4) The diets of families residing at lowland for at least two generations are quantitatively and qualitatively better than migrant family diets. 5) Comparison between Valley of Tambo diets and highland diets from various communities suggest that families residing at lowland, long-term or migrant, experience generally higher dietary intakes than those living in the Sierra.

INTRODUCTION

Dietary surveys in Peru, for the most part, have been concerned with the qualitative and quantitative evaluation of food intakes of populations residing in ecologically distinct localities (1-5). Because of this emphasis, little attention has been directed towards an understanding of the modification of dietary patterns wich results from the movement of migrant populations to different geographical areas. These modifications are usually the consequences of newly imposed social, economic and ecological conditions and may be regarded as one index of the effectiveness of the total human ecological adaptive strategy. A survey was conducted in three southern coastal Peruvian communities in the Valley of Tambo during July and August, 1971, to assess whether significant alterations of food consumption patterns appeared in the diets of downward Indian migrants.

THE VALLEY OF TAMBO

The Valley of Tambo is one of over fifty coastal oases which run east-west along the Pacific coast and has witnessed historical processes similar to most. Among these have been the shift of economic enterprise from highland to coast, the assimilation of Indian migrants into the dominant non-Indian coastal culture, and the establishment of new social, economic and political orders based on the alteration of traditional patterns. At present, in addition to the above mentioned events, the valley is undergoing government takeover of at least one large plantation under the Agrarian Reform Legislation of 1970 and attempts by the Ministry of Agricul-

ture to convert small landholding units into farm cooperatives.

A good percentage of the population of the Province of Islay, an area of 4,993 km^2, is concentrated within the valley and along the narrow coastal plain that stretches several kilometers north to Mollendo and Mejía. The total population for the province has increased from 24,940 in 1940 to 30,623 inhabitants in 1960, an increase in density from 5.0 to 6.1 persons/km^2 (6). Natural increases in population and immigration from other provinces within the Department of Arequipa or other departments account for this population increase. The majority of Indian migrants come from the Departments of Arequipa, Cuzco, Moquegua, and Puno, and are predominantly Quechua.

Total population (6) and Indian- non-Indian figures (7) for the two districts in which the survey was conducted are shown in Table 1.

General Community Characteristics

The three communities of the central valley where actual research was conducted are representative of the types found within the entire valley. Chucarapi, formerly a privately-run sugar cane plantation, is now operated by the government. The primary agricultural products are sugar and by-products. The government has incorporated a smaller hacienda into its administrative sphere, while consolidating sugar-processing plants by closing the latter's refinery operations. The resident population is comprised of a large Indian, *serrano* or *Indio*, and *cholo* (mestizo of Indian biological and cultural predominance) labor force, and a smaller semi-skilled, skilled and administrative *cholo* and *criollo* (creole or born of European parents in Peru) sector. The plantation community is largely a self-contained functioning unit with primary school, medical facilities and market place.

Cocachacra, a community whose history goes back at least to the mid-eighteenth century, is located across the valley floor on the northern side. It is the administrative center for the District of Cocachacra and the largest community in the eastern part of the valley. A full range of governmental and commercial services function in conjunction with the local, provincial and departmental political and economic patterns. Bus and *colectivo* (public long-distance taxi) transportation to Arequipa (passing through Chucarapi) and Mollendo has also helped local culture keep pace

TABLE I

POPULATION (6) AND INDIAN DOWN MIGRANT (7) FIGURES FOR THE DISTRICTS OF COCACHACRA AND DEAN VALDIVIA, PERU, 1960

Location	Total population	Male	Female
	Cocachacra		
Urban	2,869	1,545	1,324
Rural	4,094	2,428	1,666
	Dean Valdivia		
Urban	1,276	712	564
Rural	2,351	1,411	940
District	**Total migrant**	**Male**	**Female**
Cocachacra	3,472	2,182	1,290
Dean Valdivia	1,786	1,151	635

with the national mainstream. In contrast to Chucarapi, social distinctions are primarily of an economic rather than ethnic nature. *Cholos* and a small percentage of *criollos* predominate. Occupations range from tenant farmer to banker to agricultural extension worker.

People from Chucarapi and other smaller communities located nearby often frequent the community because of the wide range of services offered in Cocachacra, even though the plantation, particularly, is a reasonably self-contained administrative and commercial unit. Births, school registration, and deaths, for example, have to be registered at the office of the *concejo*, or municipal clerk.

The third representative community found in the central valley is La Curva in the District of Dean Valdivia. The population is comprised of a fairly large number of Indian migrants and a smaller *cholo* element. The community is located on a parallel axis with and bisected by a major road and situated between larger

population centers, but lacks the historical continuity found in communities such as Cocachacra. The long-term coastal resident and migrant persons living in La Curva are either small or medium-sized farm owners or wage laborers for these farm owners.

METHODS

The dietary survey was conducted in three communities within the districts of Cocachacra and Dean Valdivia, Province of Islay, coastal southern Peru. Samples consisted of long-term coastal resident and downward Indian migrants; the number of households from each community and the average consuming unit are shown in Table 2. In addition, an independent sample was generated by using the criterion that households lived for two years or less at low altitude. This group, designated "New Migrant",

TABLE 2

SAMPLE SIZES AND FOOD CONSUMPTION UNITS FOR EACH GROUP SURVEYED WITHIN THE VALLEY OF TAMBO

Group	Households (No.)	People (No.)
New Migrant	6	4.8
Cocachacra migrant	17	4.8
Cocachacra lowland	15	4.8
Total	32	4.8
La Curva	18	5.6
Chucarapi migrant	17	4.7
Chucarapi lowland	17	6.2
Total	34	5.5
Total migrant	52	5.0
Total lowland	32	5.6

is comprised of six households from the total migrant sample of 52. The linguistic affinities of the migrant population segments are presented in Table 3.

The first two years of lowland residence are regarded as that period during which the greatest cultural and economic stresses are manifest. Only migrant households were surveyed in La Curva, while both lowland and migrant households constituted the survey groups in Cocachacra and Chucarapi. Each sample group is relatively homogeneous, possessing about the same behavioral variable levels, and all are deemed segments of the local lower class. Children under the age of two were not included in the survey.

Each household was visited once and the equivalent amount for the day's meals weighed on Hansen dietary scales. A recall inventory schedule consisting of 105 foods common to both lowland and high altitude ecological zones was used to establish frequency of foods eaten during a determined period, seasonal variation, qualitative changes in dietary patterns, and the validity of reported daily meal patterns.

Pertinent socioeconomic data and cultural attitudes towards food consumption were recorded by the use of a questionnaire given prior to the inventory and weighing.

Foods were converted into edible portions and then to household daily *per capita* intake. Calculations of nutritive value of the diets were then made using composition tables specific for Latin American (8) and Peruvian (9) populations. Since this study was not designed to make asessments of individual and family nutritional adequacies, but to determine aggregate household dietary patterns (using nutrient and caloric levels as a quantitative indicator), comparison of nutrient intakes with individual family members was not made. For this reason, household age and sex composition for each group has not been included.

DIETARY PATTERNS

Assessment of Food Consumption Patterns

Differences between the composition of diets of migrant and lowland groups were relatively few and did not cause major deviations from the typical coastal food regimen. Breakfast, served between 6 and 7 a.m. consisted regularly of rolls, milk or tea, sugar for tea or hot chocolate, Quaker oats and eggs less

TABLE 3

LINGUISTIC AFFINITIES OF INDIAN DOWNWARD MIGRANTS ACCORDING TO HUSBAND AND WIFE FROM EACH HOUSEHOLD OF THE SAMPLE GROUPS

Sample group	Quechua		Aymara		Quechua & Spanish		Aymara & Spanish		Quechua, Aymara & Spanish		Other	
	M	F	M	F	M	F	M	F	M	F	M	F
Cocachacra (household No. 17)		1		–	12	10	3	4	2	1		1
La Curva (household No. 18)		–		–	10	10	7	7	1	1	–	
Chucarapi (household No. 17)		1		–	16	14		1	1	1	–	

frequently, and cheese occasionally. Coffee was not consumed regularly by any of the groups.

The noon lunch, the main meal of the day, was usually served in the form of a main dish of meat, rice, noodles or potatoes accompanied by a *caldo*, or soup, containing bits of cabbage, carrots, squash, potatoes, and meat bone and, from time to time, various other vegetables and noodle products. The *sopa*, or evening soup, is different from the *caldo* by being more substantive. It is the main evening dish.

Some of the lowland households did eat an afternoon snack, or *loncha*, of tea and bread, or some other item left over from the main meal, but not in enough quantities to significantly affect total daily calorie intake.

Substitution of *mondongo*, intestine, or *charqui*, dried meat (usually mutton), for beef was made only by the migrant groups. Fish, *corvina* or bass, was consumed infrequently, the most common explanation being that people did not know how to prepare it. Crayfish caught from irrigation ditches, was occasionally consumed in the *caldo*. Liver was eaten at least on one occasion by one migrant Cocachacran family. Chicken, duck, turkey or guinea pig are killed for household consumption on days of special significance.

Fruits consist mainly of bananas, oranges and lemons; very rarely were apples, *papayas*, *membrillos* or *chirimoyas* reported.

All sugar was consumed with beverages. Lard and oil were used primarily to brown meat. Salt, oregano, *perejil*, and *culantro* are used regularly as condiments by all groups.

Food was usually prepared in a kitchen or open-working area adjacent to the main living room. Recent or poor migrants living in Cocachacra and La Curva cooked at floor level on stones using large cast-iron pots. Aluminum cookware, however, was used by most women, and practically all households, except the poorest, had crockery plates and metal utensils. All Chucarapi apartments were provided with waist-level cooking platforms. Wood and primus stoves were often used interchangeably by all groups, but the primus was the most preferred.

The consumption of alcoholic beverages is limited to beer, rum and pisco, and these predominantly on fiesta days. *Chicha*, a mild alcoholic drink obtained by fermenting maize, is also drunk, but primarily during the summer months of October through April. These figures were not included in the survey and could conceivably have increased the total adult calorie intake.

Very few reported the use of coca, and the majority of those chewed, on the average, less than one gram a day. Some chewed their coca with *llipta.* Previous investigators (5, 10) have shown that *llipta,* an ash paste chewed with coca, can provide up to 200-500 mg of calcium daily. Those who chewed on the coast did so infrequently and in less quantity than reported in earlier investigations of highland groups. This potential source of calcium was not included in the final nutrient tabulation.

Group specificity of food items – The range of foods reported as eaten and the group specific items are shown in Table 4. Only 55 foods were designated from the total possible of 105, and these are mostly temperate items. Interesting to note is the correspondence between several highland associated foods and downward migrant groups. *Mondongo, charqui, pallares,* a type of large bean, and *quinua,* a highland grain, are some of these. Consumption of *chochoca,* corn meal mush, and *moraya,* a leached form of *chuño,* all traditionally Indian foods, by Cocachacran lowlanders only, is indicative of the general overall non-group specificity. *Chuño,* a frozen, thawed, dried, and crushed potato commonly eaten in the highlands, is consumed by all groups except the Cocachacran lowland families. The commonalty of foods eaten by all groups suggests a regularity dictated by market availability rather than true preference. On the other hand, food consumption practices are usually modified concomitantly with changes in cultural and social status to conform to the symbols of status associated with the social position of the consumer.

General attitudes towards food – Responses to questions on specific food preferences revealed no significant clustering. There does, however, seem to be a general preference for red meat, *pasta* and beans by all groups.

The most frequent response for general types of tabooed or dangerous foods was one of "no difference", the highest percentage of this response coming from men and children (Table 5). Fats, hot peppers and beans were consistently reported as being tabooed or dangerous by women of all groups interviewed despite the fact that all were eaten. No substantive reasons were cited for this attitude.

Another series of responses to questions concerning more general preferences between hot and cold foods revealed again a

TABLE 4

GROUP SPECIFICITY OF FOOD ITEMS CONSUMED BY HOUSEHOLDS FROM THE THREE SURVEY COMMUNITIES

Food	New	Cocachacra		La Curva	Chucarapi	
	Migrant	Migrant	Lowland		Migrant	Lowland
Chocolate	−	−	+	+	+	−
Coffee	+	+	+	+	+	+
Tea	+	+	+	+	+	+
Milk	+	+	+	+	+	+
Beef	+	+	+	+	+	+
Liver	−	+	−	−	−	−
Mondongo	+	−	−	+	−	−
Fish	−	+	+	+	+	+
Charqui	+	+	+	−	+	−
Egg	−	+	+	+	+	+
Cheese	−	+	+	+	+	+
Bread	+	+	+	+	+	+
Wheat	−	+	−	−	−	+
Quinoa	+	+	−	−	−	−
Rice	+	+	+	+	+	+
Quaker oats	+	+	+	+	+	+
Chochoca	−	−	−	−	−	+
Tallarines	−	−	+	+	+	−
Noodles	+	+	+	+	+	+
Oats	−	−	+	+	+	+
Dry corn	−	+	+	+	+	+
Flour	−	−	−	−	−	+
Hot pepper						
Aji	+	+	+	+	+	+
Rocoto	−	+	+	+	+	+
Chick peas	−	−	−	−	+	−
Potatoes	+	+	+	+	+	+
Chuño	+	+	−	+	+	+
Moraya	−	−	−	−	−	+
Turnip	+	+	+	+	+	+
Dry broad bean	−	+	−	+	+	+
Fresh broad bean	+	+	+	+	+	+
Chalona	+	+	+	+	+	+
Culantro	+	+	−	+	+	+
Tomato	+	+	+	+	+	+

TABLE 4 (continued)

Food	New Migrant	Cocachacra Migrant	Cocachacra Lowland	La Curva	Chucarapi Migrant	Chucarapi Lowland
Beans						
Frijoles	+	+	−	+	+	+
Pallares	−	+	−	−	+	−
Olluco	−	−	−	−	+	−
Carrots	+	+	+	+	+	+
Cabbage	+	+	+	+	+	+
Squash	+	+	+	+	+	+
Sweet potato	+	+	−	+	+	+
Lettuce	−	+	−	+	−	−
Yuca	−	−	−	−	−	+
Choclo	−	−	−	−	+	−
Onion	+	+	+	+	+	+
Banana	−	+	+	+	+	+
Orange	+	+	+	+	+	+
Papaya	−	−	−	−	−	+
Lemon	+	+	+	+	+	+
Membrillo	−	+	−	−	−	+
Sugar	+	+	+	+	+	+
Oil	+	+	+	+	+	+
Margarine	−	+	+	+	−	+
Lard	+	+	+	+	+	+
Salt	+	+	+	+	+	+

high percentage of "no difference" answers (Table 6). In addition, the humoral quality attributed to foods by highland natives described by Mazess (11), seems to have been almost completely lost. In its place is a designation of food quality by its thermal rather than innate quality.

Seasonality of foods eaten – The participation of all households in a wage-income economy, purchases of items coming from different parts of Peru, and a small reliance on home-grown foods is reflected in little diet seasonality. In response to questions of what month they ate better or much, people most often stated that there was a minimal difference. Those who said there was a difference cited consistently the harvest time of August through

October. These were predominantly landowners, as opposed to agricultural laborers, who either sold their produce or consumed part of it. An earlier investigation of a coastal population (1) also recorded lack of any significant seasonal variation, largely due to the moderate annual climate and participation in an income-oriented market economy.

TABLE 5

PERCENTAGE DISTRIBUTION OF RESPONSES BY HOUSEHOLD ACCORDING TO GROUP REGARDING TABOOED OR DANGEROUS FOODS

Category	Cocachacra		La Curva	Chucarapi	
	Migrant	Lowland		Migrant	Lowland
	"No difference" responses				
Foods not allowed to be eaten by women	82.4	73.3	61	64.7	58.8
Foods not allowed to be eaten by men	94.1	93.3	83.3	82.4	88.2
Foods not allowed to be eaten by children	100	80	83.3	100	100

Nutrient Beakdown of the Diets

Inspection of both intake and percentage contributions of the predominant daily foods (foods comprising at least 1% of the total bulk intake) in Table 7, reveals diets which have comparative intergroup similarity. Milk, meat, bread, rice, noodles and potatoes constitute the principal bulk contributors to all the diets. The other primary contributors to the midday and evening meals – tomatoes, carrots, cabbage, squash and onions – make up

TABLE 6

DISTRIBUTION OF RESPONSES BY HOUSEHOLD ACCORDING TO GROUP, TO QUESTIONS REGARDING THE GENERAL QUALITY OF FOODS

Question	Response	Cocachacra		La Curva	Chucarapi	
		Migrant	Lowland		Migrant	Lowland
Fresh foods	Better	2	5	1	3	6
are___than	No diff.	15	9	11	12	7
hot foods	Poorer	0	1	2	2	4
Fresh foods						
have___	More	2	3	6	2	9
flavor than	No diff.	15	11	10	12	2
hot foods	Less	0	1	2	3	6
Like fresh						
foods___	More	3	3	3	3	4
than hot	No diff.	14	10	13	12	9
foods	Poorer	0	2	2	2	4
Eats fresh						
food at a						
meal___	More	0	0	0	2	1
than hot	No diff.	13	13	15	15	13
food	Poorer	4	2	3	0	3
Eats fresh						
food daily	More	1	0	0	1	1
___than hot	No diff.	14	14	17	16	14
food	Poorer	2	1	1	0	2

almost 15°/o of the total intake. In addition, a small percentage of the diets is consumed in the form of fruit and sugar. It is from these sources that the greater percentage of calories and nutrients come.

A tabulation of total calories and important nutrients for each group, outlined in Table 8, again shows an overall uniformity, despite some noticeable differences.

The New Migrant and Cocachacra migrant daily total calorie figures are about 500 less than those of the La Curva and Chucarapi groups. No exceptional differences exist which account for this disparity, although low consumption of meat, milk and potatoes helps to lower the calorie intakes of the New Migrant families. Other differences contributing to the high or low total intakes are low Cocachacra milk consumption, a high rice intake for Cocachacra lowlanders, and high sugar intakes for both Chucarapi groups. Most differences, however, are small and contribute cumulatively to a low or high intake.

The greatest single calorie contributor comes from bread which constitutes over 25% of the total calorie intake, and a high value of 38% for the New Migrant group (Table 9). Meat, rice, Quaker oats, noodles, potatoes, and sugar are also high contributors.

Animal protein comprises about 25% of the total protein intake for all group diets, while grain and cereal - related products account for over 40% (Table 10).

Fat intake for the New Migrant is lower than in the other groups, reflecting lower intake of meat and oil. Low milk consumption influences the Cocachacra migrant calcium and riboflavin daily intakes. The Cocachacra vitamin C intake is less because of a lower orange and lemon consumption. Most vitamin C, however, is obtained from the potato. Main sources of vitamin A for all groups are the *ají,* carrots and sweet potato.

Evaluation of the Diets

The ICNND standards (12) suggested for the interpretation of Peruvian nutritional data are based on guides for a 25-year-old, physically active male of 67 in (170 cm) in height and 143 lb (65 kg) in weight, living in a temperate climate and consuming a varied diet. Short-term physiological adaptation to lower intakes of certain nutrients and interpopulation differences in metabolic utilization caution against a strict interpretation of a comparison between the actual and the recommended intakes. In addition, environmental and cultural factors can modify requirements and alter the nutrient content of foods. Calculation of percent-

TABLE 7

MEAN DAILY INTAKE OF GRAMS BY HOUSEHOLD (PER HEAD), AND PERCENTAGE OF FOODS ACCORDING TO GROUPS IN THE THREE SURVEY COMMUNITIES

Food	New		Cocachacra				La Curva		Chucarapi			
	Migrant (1,573 g)		Migrant (1,561 g)		Lowland (1,660 g)		(1,872 g)		Migrant (1,886 g)		Lowland (1,950 g)	
	g	%	g	%	g	%	g	%	g	%	g	%
Milk	104	6.6	51	3.2	163	9.8	156	8.3	198	10.4	258	13.2
Meat	115	7.3	136	8.7	150	9.0	152	8.1	165	8.7	165	8.4
Fish	–	–	10	0.6	9	0.5	21	1.1	1	–	28	1.4
Egg	–	–	20	1.2	5	0.3	6	0.3	11	0.5	19	0.9
Bread	384	24.4	327	20.9	340	20.4	392	20.9	318	16.8	295	15.1
Rice	141	8.9	138	8.8	198	11.9	164	8.7	166	8.8	144	7.3
Quaker oats	29	1.8	28	1.7	12	0.7	25	1.3	21	1.1	12	0.6
Tallarines	–	–	–	–	3	0.1	21	1.1	22	1.1	–	–
Noodles	69	4.4	52	3.3	54	3.2	71	3.7	72	3.8	48	2.4
Dry corn	–	–	28	1.7	14	0.8	15	0.8	33	1.7	56	2.8
Potatoes	240	15.3	299	19.1	317	19.0	306	16.3	332	17.6	314	16.1
Chuño	26	1.7	9	0.5	–	–	16	0.8	28	1.4	1	–
Fresh broad bean	7	0.4	4	0.2	9	0.5	9	0.4	30	1.5	14	0.7
Tomato	33	2.1	37	2.3	39	2.3	40	2.1	40	2.1	53	2.7
Bean (frijoles)	16	1.0	15	0.9	–	–	11	0.5	5	0.2	17	0.8
Carrot	41	2.6	40	2.5	51	3.0	33	1.7	54	2.8	37	1.8
Cabbage	40	2.5	31	1.9	21	1.2	32	1.7	31	1.6	29	1.4

TABLE 7 (continued)

Food	New Migrant (1,573 g)		Cocachacra Migrant (1,561 g)		Cocachacra Lowland (1,660 g)		La Curva (1,872 g)		Chucarapi Migrant (1,886 g)		Chucarapi Lowland (1,950 g)	
	g	o/o	g	o/o	g	o/o	g	o/o	g	o/o	g	o/o
Squash	44	2.7	32	2.0	33	1.9	45	2.4	49	2.5	48	2.4
Sweet potato	52	3.3	27	1.7	–	–	86	4.5	10	0.5	30	1.5
Onions	56	3.6	43	2.7	47	2.8	48	2.5	43	2.7	58	2.9
Banana	–	–	27	1.7	23	1.3	24	1.2	27	1.7	29	1.8
Orange	35	2.2	32	2.0	9	0.5	41	2.1	32	2.0	50	2.5
Lemon	17	1.1	9	0.5	9	0.5	9	0.4	9	0.5	25	1.2
Sugar	55	3.4	54	3.4	68	4.0	72	3.8	54	3.4	101	5.1
Oil	11	0.7	14	0.8	26	1.5	18	0.9	14	0.8	15	0.7
Salt	16	0.1	11	0.6	14	0.8	14	0.7	17	1.0	15	0.7

TABLE 8

MEAN DAILY INTAKE OF CALORIES AND NUTRIENTS BY HOUSEHOLD (PER HEAD) ACCORDING TO GROUPS, IN THE THREE SURVEY COMMUNITIES

House-holds (No.)	Calories kcal	Protein g	Fat g	Carbo-hydrate g	Calcium mg	Phosphorous mg	Iron mg	Vitamin A I. U.	Thia-mine mg	Riboflavin mg	Niacin mg	Ascorbic acid mg
						New Migrant						
6	3,353	98	44	635	530	1,494	20	2,390	1.5	1.3	22.4	130.8
						Cocachacra migrant						
17	3,308	103	58	591	451	1,573	21	2,868	1.6	1.4	23.9	119.8
						Cocachacra lowland						
15	3,526	99	74	613	623	1,543	19	4,301	1.4	1.5	24.3	105.5
						La Curva						
18	3,898	113	66	712	608	1,758	22.2	3,343	1.8	1.6	26.2	153.3
						Chucarapi migrant						
17	3,776	111	69	705	650	1,829	22.2	5,256	1.8	1.8	27.0	134.9
						Chucarapi lowland						
17	3,754	114	81	647	677	1,845	22.4	3,823	1.9	1.8	26.2	159.9

TABLE 9

PERCENTAGE CONTRIBUTIONS OF CALORIES OF MAJOR FOOD BY HOUSEHOLDS (PER HEAD), ACCORDING TO GROUPS IN THE THREE SURVEY COMMUNITIES

Food	New	Cocachacra		La Curva	Chucarapi	
	Migrant (3,353 kcal) %	Migrant (3,308 kcal) %	Lowland (3,526 kcal) %	(3,898 kcal) %	Migrant (3,776 kcal) %	Lowland (3,754 kcal) %
Milk	1.8	0.9	2.8	2.4	1.6	4.1
Meat	8.4	10.0	10.4	9.5	10.7	10.7
Fish	–	0.3	0.3	0.5	0.02	0.7
Egg	–	0.9	0.2	0.2	0.4	0.7
Bread	38.0	32.8	32.0	33.4	27.9	26.1
Rice	15.0	14.9	20.1	15.0	15.7	13.7
Quaker oats	3.4	3.3	1.3	2.5	2.2	1.3
Tallarines	–	–	0.3	1.8	2.0	–
Noodles	7.1	5.4	5.2	6.3	6.5	4.4
Dry corn	–	3.1	1.4	1.4	3.2	5.4
Potatoes	4.7	5.9	5.8	5.1	5.7	5.4
Chuño	2.6	0.9	–	1.4	2.5	0.07
Fresh broad bean	0.2	0.2	0.3	0.3	0.9	0.5
Tomato	0.2	0.2	0.2	0.2	0.2	0.3
Bean	1.6	1.5	–	0.9	0.5	1.5
Carrot	0.5	0.5	0.6	0.4	0.6	0.4
Cabbage	0.3	0.3	0.2	0.2	0.2	0.2
Squash	0.4	0.3	0.3	0.4	0.4	0.4
Sweet potato	1.8	0.9	–	2.6	0.3	0.9
Onions	0.7	0.6	0.6	0.6	0.6	0.7
Banana	–	0.8	0.6	0.6	0.7	0.7
Orange	0.4	0.4	0.1	0.4	0.2	0.6
Lemon	0.1	0.09	0.08	0.07	0.1	0.2
Sugar	6.3	6.3	7.4	7.1	9.8	10.4
Oil	2.9	3.7	6.5	4.1	3.7	3.5

ages of recommended intakes, nevertheless, does provide a general frame of reference with which to evaluate diets.

Seven nutrients were compared to the ICNND guides, and, as the data on Table 11 reveal, all intakes of these nutrients from each group exceed the acceptable values, with the exception of the New Migrant, Cocachacra and La Curva migrant vitamin A intakes.

Intercommunity and Group Dietary Comparisons

Table 12 shows the calorie distribution of the diets in the present study, and of the diets from three highland communities. The derivation of calories from the coastal groups is similar, with the exception of a high carbohydrate contribution from the New Migrant sample and high fat contribution from the total lowland sample.

The New Migrant sample does have a calorie distribution similar to that from Nunoa (5) where the main components of the diet were *chuño negro*, two varieties of local grain, *cañihua* and *quinua*, barley, and sheep meat. These food items are in contrast to the vegetable, rice, noodle, beef, bread, sugar and oil, characteristic of the lower altitudes. *Quinua* and barley, though, provide a large portion of calories, protein and other nutrients of a highland diet. Chacán and Vicos have the highest carbohydrate contribution of calories; there, as in Nunoa, reflecting high tuber and grain bulk intakes.

Nutrient intakes for all migrant and lowland households from each community surveyed in the Valley of Tambo and those recorded from communities in other parts of Peru are shown in Table 13. The differences between total migrant and lowland diets are almost negligible, with the exception of calcium which is lower in the migrant population.

Practically all calorie and nutrient intakes recorded from the Valley of Tambo households are higher than those from communities in other parts of the country. The two Nunoa surveys (5, 10) are the exceptions where iron, thiamine, riboflavin and niacin recorded during the 1962 survey and calcium, iron, vitamin A, thiamine and riboflavin figures obtained from the 1967 study are higher, in selected cases, than nutrient intakes calculated for the present study.

Picón-Reátegui (14) has pointed out that the results of the *Instituto de Nutrición* surveys [Table 13 (2, 12)] are so low that is would be difficult for high-altitude residents to maintain weight

TABLE 10

PERCENTAGE CONTRIBUTION OF PROTEIN BY HOUSEHOLD (PER HEAD), ACCORDING TO GROUPS IN THE THREE SURVEY COMMUNITIES

Food	New	Cocachacra		La Curva	Chucarapi	
	Migrant (98 g) o/o	Migrant (103 g) o/o	Lowland (99 g) o/o	(113 g) o/o	Migrant (111 g) o/o	Lowland (114 g) o/o
Milk	3.1	1.9	5.1	4.4	5.4	7.0
Meat	22.4	24.3	28.3	24.8	27.9	27.2
Fish	–	1.9	2.0	3.5	0.2	5.3
Egg	–	1.9	0.6	0.6	0.9	1.8
Bread	33.7	27.2	29.2	30.1	24.3	21.9
Rice	9.2	8.7	13.1	9.7	9.9	7.9
Quaker oats	4.1	3.9	2.0	3.5	2.7	1.8
Tallarines	–	–	0.3	1.8	1.8	–
Noodles	7.2	4.9	6.1	6.2	6.3	4.4
Dry corn	–	2.9	1.0	0.9	2.7	4.4
Potatoes	5.1	5.8	6.1	5.3	5.4	5.3
Chuño	1.0	0.4	–	0.5	0.9	0.03
Fresh broad bean	0.7	0.4	0.8	0.7	2.7	0.9
Tomato	0.3	0.3	0.3	0.3	0.3	0.4
Bean	4.1	2.9	–	1.8	0.9	3.5
Carrot	0.4	0.4	0.5	0.3	0.5	0.3
Cabbage	0.7	0.5	0.4	0.4	0.5	0.4
Squash	0.3	0.2	0.2	0.3	0.3	0.3
Sweet potato	0.7	0.4	–	0.9	0.09	0.4
Onions	0.8	0.6	0.7	0.6	0.9	0.7
Banana	–	0.3	0.3	0.3	0.4	0.4
Orange	0.3	0.3	0.1	0.3	0.09	0.4
Lemon	0.1	0.04	0.1	0.08	0.09	0.2

and body composition on such low calorie intakes. Dietary comparison between the Valley of Tambo groups and the Institute communities should be regarded with this in mind.

TABLE 11

EVALUATION OF GROUP DIETS BY HOUSEHOLD (PER HEAD), USING THE ICNND STANDARDS FOR DAILY INTAKE

Nutrient	Suggested intake per day		New Migrant	Cocachacra		La Curva	Chucarapi	
	Deficient or low	Acceptable or high		Migrant	Lowland		Migrant	Lowland
				Percentage of acceptable				
Niacin	9.0 mg	10.2 mg	100.0	100.0	100.0	100.0	100.0	100.0
Riboflavin	1.1 mg	1.2 mg	100.0	100.0	100.0	100.0	100.0	100.0
Thiamine	0.29 mg/ 1,000 cal	0.30 mg/ 1,000 cal	100.0	100.0	100.0	100.0	100.0	100.0
Ascorbic acid	29.0 mg	30.0 mg	100.0	100.0	100.0	100.0	100.0	100.0
Vitamin A	3,499 I.U.	3,500 U.I.	68.0	81.9	100.0	95.5	100.0	100.0
Calcium	390 mg	400 mg	100.0	100.0	100.0	100.0	100.0	100.0
Iron	8.0 mg	9.0 mg	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 12

CALORIC DISTRIBUTION OF DIETS BY HOUSEHOLD (PER HEAD), FOR GROUPS, IN THE THREE SURVEY COMMUNITIES AND IN COMMUNITIES IN OTHER REGIONS OF PERU

Group or community	Month	Households No.	Carbohydrates %	Protein %	Fat %
New Migrant	July–August	6	77.6	11.0	11.3
Cocachacra migrant	July–August	17	73.1	11.8	15.1
Cocachacra lowland	July–August	15	71.3	10.6	18.1
La Curva migrant	July–August	18	74.6	10.9	14.5
Chucarapi migrant	July–August	17	73.9	10.8	15.2
Chucarapi lowland	July–August	17	70.1	11.4	18.4
Total migrant	July–August	52	73.9	11.1	14.9
Total lowland	July–August	32	70.8	11.0	18.2
Total Cocachacra	July–August	32	72.2	11.2	16.6
Total Chucarapi	July–August	34	72.1	11.1	16.8
Nunoa*	July	39	89.1	8.8	2.1
Nunoa**	July–August	22	78.4	12.2	10.4
Chacán***	December	43	85.2	9.5	5.4
Chacán***	June	39	83.3	9.4	7.3
Vicos***	July	40	79.4	12.1	8.5
Vicos***	February	37	83.4	9.8	6.8

* Mazess and Baker (5); ** Gursky (13); *** Collazos *et al.* (2).

TABLE 13

COMPARISON OF MEAN DAILY NUTRIENT INTAKES BY HOUSEHOLDS (PER HEAD), BETWEEN GROUPS IN THE VALLEY OF TAMBO AND COMMUNITIES IN OTHER REGIONS OF PERU

Community or group	Calories kcal	Protein g	Calcium mg	Iron mg	Vitamin A I.U.	Thiamine mg	Riboflavin mg	Niacin mg	Ascorbic acid mg
Total migrant	3,661	109	570	22	3,822	1.7	1.6	25.7	136.0
Total lowland	3,640	106	650	21	4,062	1.7	1.7	25.3	132.7
Total Cocachacra	3,417	101	537	20	3,585	1.5	1.4	24.1	112.7
Total Chucarapi	3,765	113	664	22	4,540	1.8	1.8	26.6	147.4
La Curva	3,898	113	608	22	3,343	1.8	1.6	26.2	153.3
Nunoa (5, 13)	3,170	69	441	22	102	1.8	2.1	40.7	113.6
	2,027	62	646	24	3,502	3.1	1.7	21.8	36.9
Chacán (2)	1,404	35	76	13	17	1.7	0.9	14.3	68.0
	1,194	31	426	17	3,265	1.6	1.0	15.0	43.0
Vicos (2)	1,509	44	125	17	84	1.8	0.9	15.2	71.0
	1,481	35	138	12	50	2.0	0.7	17.1	77.0

TABLE 13 (continued)

Community or group	Calories kcal	Protein g	Calcium mg	Iron mg	Vitamin A I.U.	Thiamine mg	Riboflavin mg	Niacin mg	Ascorbic acid mg
Tumbes (12)	2,228	63							
San Nicolás (12)	2,050	53							
	1,850	45							
Carquín (12)	2,132	70							
	2,067	87							
Tacna (12)	2,658	79							
Yurimaguas (12)	1,774	56							
	1,892	59							
Iquitos (12)	1,627	47							
Mendoza (12)	2,722	77							

COMMENTS AND CONCLUSION

In a recent publication (15), investigators of the food habits of Yungay, a Peruvian Andean community, demonstrated that food scales correlated highly with a number of socioeconomic indicators of increasing complexity, which included occupation, educational level, level of living, and house typology. Since the migrant and lowland groups of the present study correspond to the social types found in the Valley of Tambo social system, as suggested in a previous section, behavioral variables determining social ranking were used to determine whether dietary differences were, in fact, a result of socioeconomic factors or of some other influence. If correlations between social position and type of dietary pattern, qualitative or quantitative, can be established, the types of adjustment made by migrant populations to new cultural and environmental settings would be better understood.

The behavioral variables used as criteria for social ranking are as follows: occupation and education of the family head and spouse; type of principal wall used in house construction; location of the performance of bodily function; type of cooking fuel used; and, whether a sewing machine, radio, and/or record player were part of the material goods inventory. In an earlier study (16) conducted in Guatemala, I showed that changes from ladinoized Indian to new and old *ladino*, or non-Indian cultural status were associated with changes in house type, occupation and land tenure, behavioral variables which had positive effects on the food consumption patterns. Calorie and nutrient intakes in the Guatemalan case increased from low to high socioeconomic groups. It should be remembered that in the present study, samples are comprised of lower class families.

As stated in an earlier section, lowland Cocachacra and Chucarapi families generally enjoy higher calorie and nutrient intakes than migrants living in the two communities. In effect, inspection of Table 14 reveals percentage distributions which tentatively confirm the expected pattern, thus providing some accountability of intracommunity lower class dietary variability.

Types of occupation, levels of education, location of bathroom functions, and, to a certain degree, wall types, are more indicative of social ranking than the other variables and are those which tend most to differentiate lowland and migrant groups. Wall types and the performance of necessities as criteria for the Chucarapi groups are somewhat negated by comparatively uniform

TABLE 14

PERCENTAGE DISTRIBUTION OF BEHAVIORAL VARIABLES BY HOUSEHOLD ACCORDING TO GROUP

Variable	Category	Cocachacra		La Curva	Chucarapi	
		Migrant (17) %	Lowland (15) %	(18) %	Migrant (17) %	Lowland (17) %
Occupation (male)	No job	5.9	–	11.1	–	–
	Works rented land	–	20.0	–	–	–
	Agricultural laborer	76.5	53.3	66.7	100.0	64.7
	Artisan	5.9	–	–	–	–
	Driver	–	13.3	5.6	–	11.8
	Other	11.7	13.3	16.7	–	23.5
Occupation (female)	Housewife	100.0	100.0	100.0	100.0	100.0
Education (male)	2 years or less	70.7	26.7	72.2	70.6	29.4
	3 years or more	29.3	73.3	27.8	29.4	70.6
Education (female)	2 years or less	76.4	40.0	88.9	88.2	35.4
	3 years or more	23.6	60.0	11.1	11.8	64.6

Table 14 (continued)

Variable	Category	Cocachacra		La Curva	Chucarapi	
		Migrant (17) %	Lowland (15) %	(18) %	Migrant (17) %	Lowland (17) %
Owner of house	Household head	17.6	33.3	38.9	–	–
	Rented	82.4	66.7	61.1	–	–
	Plantation	–	–	–	100.0	100.0
Amount of land	No land	88.2	73.3	77.8	58.8	47.1
	1 topo* or less	11.8	13.3	–	41.2	29.4
	Greater than 1 topo	–	13.3	22.2	–	22.5
Principal wall	Adobe	17.6	46.7	–	17.6	11.8
	Cement, brick	–	–	–	82.4	88.2
	Quinche**	70.6	53.3	100.0	–	–
	Wood	11.8	–	–	–	–
Necessities	Bathroom in house	–	–	–	–	–
	Bathroom out of house	11.8	80.0	22.2	100.0	100.0
	Field, countryside	88.2	20.0	81.8	–	–

* Ancient land measurement used by Peruvian Indians.
** Cane and mud constructed walls.

Table 14 (continued)

Variable	Category	Cocachacra		La Curva	Chucarapi	
		Migrant (17) %	Lowland (15) %	(18) %	Migrant (17) %	Lowland (17) %
Cooking fuel	Wood	47.1	60.0	66.7	5.9	—
	Primus	23.5	26.6	11.1	35.3	94.1
	Both	29.4	13.4	22.2	59.8	5.9
Sewing machine	Yes	23.5	13.3	22.2	47.1	76.5
	No	76.5	86.7	77.8	52.9	23.5
Record player	Yes	11.8	20.0	11.1	47.1	35.3
	No	88.2	80.0	88.9	52.9	64.7
Radio	Yes	52.9	53.3	50.0	58.8	76.5
	No	47.1	46.7	50.0	41.2	23.5

housing. Lowland families, however, apparently as a matter of course do have more rooms in their apartments than the two rooms which are typical of migrant quarters. All Chucarapi apartments also have a bathroom area outside of the living area proper but adjacent to it.

Why the La Curva migrant diets are of higher nutrient quality than the total Cocachacra group and comparable to the Chucarapi intakes cannot be easily accounted for by these behavioral variables, as indicated in Table 14. Even though access to land for planting is greater, the actual incidence of land ownership or rental was no higher than other groups. There does seem to be an indication that money earned from wage labor is reinvested in the form of calories and nutrients rather than in the accoutrements of new social statuses. Concentration of migrant families in different parts of the community also tended to reinforce ethnic identification. In addition, it is possible that a percentage of wages might be spent at high altitude for the maintenance of indigenous "fiesta" patterns, the support of relatives, and/or use when and if the migrants return to their *sierra* community.

Guaranteed wages and housing provided by the plantation operation placed Chucarapi residents in a secure economic position which apparently assured adequate levels of nutrient intake.

Cocachacra is typical of communities where, once a change in cultural status has been made, upward mobility is extremely difficult. This is largely because of the educational and occupational limitations which are placed on migrant attempts to accumulate wealth necessary for a change from an ascribed to achieved status.

What explanations can be offered for the extreme differences between lowland and highland caloric and protein figures shown in Table 13? The low highland figures can be possibly attributed to artifactual errors during the process of collection, as Picón-Reátegui (14) suggests, while similar error factors could be responsible for the lowland figures. Economic and agricultural information collected during the Tambo dietary survey, however, indicates resources not always apparent by household appearance or material inventory. Each household in Cocachacra and La Curva, almost without an exception, possessed a *huerta,* a garden within the household compound or in nearby plots, and *chacras,* plots usually larger than a *huerta,* located at the periphery of the towns. Produce from the *chacra,* predominantly, was sold locally at the market or to wholesale buyers, while food

grown on the *huerta* was used primarily for household consumption. In addition, at least one member of the household worked as a laborer providing other sources of income and complementing seasonal variations in harvest. At the Chucarapi plantation, workers were given one *topo* (1.59 acres) of land to plant as they saw fit, a guaranteed wage, and housing. Families living in the three communities, therefore, had both agricultural and economic resources which permitted high consumptive patterns.

Although income figures are not available to determine the actual percentage spent on food above that grown, informants indicated that a good deal was allocated for this purpose. Evidence also suggests that as wage earning ability or general income generating sources increased, so did food purchases along with material investments; the La Curva pattern was somewhat an exception. The availability of food items in local *tiendas,* or stores, and the weekly markets on a regular basis assured a pattern of food consumption that was reasonably constant throughout the year. The high intakes of carbohydrates for the lowland groups shown in Table 8 contributed, not surprisingly, to the high recorded caloric intake levels. The availability of meat slaughtered weekly in the communities' *camales,* combined with the economic resources to purchase it, and household sources, along with the protein contribution from grain sources consumed in the form of bread and *pasta,* raised the protein intakes considerably. The shift in caloric distribution to a lower carbohydrate percentage has been shown in Table 12.

The only comparative caloric and protein figures of intakes for pre-migrant groups at high altitude were presented in Table 13, the first study of Nunoa (5) revealing a caloric level on the average 506 calories less and a protein level almost fifty percent less. No attempt was made in the present study to determine the highland nutrient and caloric levels of the migrant groups interviewed.

This investigator is fully aware of the limitations of making conclusions on the basis of a household aggregate consumption figure without particular reference to individual members; therefore, Table 11 is not offered as a conclusive statement. The purpose of this paper was not to determine or evaluate nutritional status, but to investigate differences in dietary patterns between resident lowland and migrant highland groups. Nutrient and caloric levels have been used only as one index.

With this purpose in mind and the results of an examination

of the diets of long-term coastal residents and shor-term migrants, certain conclusions can be drawn about the food consumptive patterns of two segments of a population living in one coastal valley of Peru.

1. Migrant dietary levels of calories and nutrients are adequate when compared to ICNND standards with the exception of vitamin A. Lowland diets are within the acceptable level.

2. The diet of migrant families residing for two years or less at low altitude has lower calorie and nutrient levels than total average migrant intakes from the three communities. This suggests that newly established migrant families experience some economic or cultural stresses during initial contact, but apparently not enough to significantly lower their dietary levels below acceptable standards.

3. The minimal retention of highland foodstuffs in the total food inventory and loss of particular attitudes towards foods suggest that consumption patterns change rapidly upon arrival to a new cultural and environmental setting. This is probably the result of two factors. First, foods specific to highland ecological zones are not readily available in coastal markets. Second, in changing from *indio* to *cholo* status, the downward migrant also makes changes in his overall consumption pattern, including foods in the diet, which adhere to the new mode of life style.

4. In general, diets of families residing at lowland (Cocachacra and Chucarapi) for at least two generations are quantitatively and qualitatively better than migrant family diets. Differences in behavioral variables appear to account, in part, for this discrepancy.

5. Comparison between the Valley of Tambo diets and the highland diets from various communities suggest that families residing at lowland, long-term or migrant residents, generally experience higher dietary intakes than those living in the Sierra.

RESUMEN

ENCUESTA DIETETICA DE INDIGENAS MIGRATORIOS HACIA LAS ZONAS BAJAS, Y DE RESIDENTES COSTEÑOS DE LARGA PERMANENCIA EN LA COSTA SUR DEL PERU

En este trabajo se presentan los resultados de una encuesta dietética llevada a cabo en tres comunidades de la costa sur del Perú, en el Valle de Tambo, durante los meses de julio y agosto de 1971. Su objetivo primario fue la evaluación de alteraciones significativas en los patrones de consumo alimentario de los indígenas migratorios hacia las zonas bajas. Usando una combinación de técnicas de peso y de inventario de recordatorio, se obtuvo: la cantidad y frecuencia de alimentos consumidos durante un período determinado; las variaciones de estación y los cambios cualitativos de las dietas de residentes de larga permanencia en la costa, y de familias indígenas migratorias hacia las zonas bajas del país. Aun cuando los resultados de la encuesta se basan en la totalidad de las cifras obtenidas en cada familia y no representan un intento de evaluar el estado nutricional individual, se puede llegar a ciertas conclusiones acerca de los patrones de consumo de alimentos de las familias migratorias y residentes. Estas son: 1) Los niveles dietéticos de calorías y nutrientes de las familias migratorias parecen ser adecuadas al compararse con los estándares del ICNND, salvo en lo que concierne a vitamina A. 2) La dieta de las familias migratorias residentes por un período de dos años o menos a bajas altitudes contiene niveles inferiores de calorías y nutrientes que el promedio total de las ingestas de las migratorias. 3) La retención mínima de los productos alimenticios del altiplano en el inventario total de alimentos, y la pérdida de actitudes específicas hacia éstos sugiere que los patrones de consumo cambian rápidamente al llegar a un lugar diferente en cuanto a cultura y ambiente. 4) Las dietas de las familias residentes en tierras bajas por lo menos durante dos generaciones son cuantitativa y cualitativamente mejores que las dietas de las familias migratorias. 5) La comparación entre las dietas del Valle de Tambo y las de varias comunidades del altiplano sugiere que las familias que residen en tierras bajas, ya sean de larga permanencia o migratorias, generalmente tienen ingestas dietéticas más altas que los que habitan en la Sierra.

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