Assessment of lunch served in the Workers' Food Program, Brazil

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Abstract

Objective
In the light of the Workers' Food Program (WFP) growth and its recent review of nutritional parameters regulations, the study aimed at evaluating food intake in WFP through dietary assessment of lunch served in the program and workers' nutritional status.

Methods
A cross-sectional study was carried out in a representative sample of workers in Brasília, Federal District, Brazil. A total of 1,044 subjects who had lunch at 52 food and nutrition units were evaluated. Social-economic and demographic data were collected as well as anthropometric measures for calculating the Body Mass Index. Food intake was assessed by dish weight and direct observation of dish composition.

Results
Of all subjects, 43% had excess weight, 33.7% were overweight and 9.3% were obese. Males were most affected. Median lunch energy intake was 515 kcal in women and 736 kcal in men. Median dietary fiber intake was 6.0 g among women and 8.3 g among men, and median cholesterol intake was over 90 mg among subjects with excess weight.

Conclusions
The results indicate that the study population who is often seen as healthy is at nutritional risk. Workers in WFP should be targeted for health promotion strategies using especially nutritionists' skills as educators.

INTRODUCTION

The Workers' Food Program (WFP) was established under Act 6,321 of April 14, 1976[12] with the purpose of improving workers' nutritional status, especially of low income workforce, and aiming at generating a clear impact on their quality of life, reducing work-related injuries, increasing their productivity and preventing occupational health conditions as well. As WFP target is workers' health, minimal nutritional requirements should be met. The main meals – lunch and dinner – should provide at least 1,400 kcal or either 1,200 kcal for low-intensity jobs and 1,600 kcal for high-intensity jobs.

The WFP's 25th anniversary was celebrated in 2002, and there are now eight million workers of more than 103 thousand companies enrolled in the program, 52% receiving meals on-site (cafeterias, buffet service or food basket programs) and 48% getting them in restaurants and marketplaces or through food and meal cupons.[10]

Throughout the years the WFP has evolved, its internal subvention system has changed and a wider range of options has been available to meet its clientele's nutritional needs. It has paralleled the same advances seen in the food area in Brazil on account

of people's demands and social changes. It should be underlined the relevance of nutritionists' role and their need in heading the Food and Nutrition Units (FNU), acting as health promoters close to the large clientele of this growing industry.

Numerous WFP-affiliated eating places offer self-services and pay-by-weight self-services and they are widely available in both business and industrial facilities. Therefore, the WFP clientele has taken control over meal choice and its composition, which was prevented before when conventional menu and standard buffet programs were in place. Yet being able to choose does not imply people will opt for a healthy meal where both energy and nutrient intake meet their needs and ensure that a healthy weight is maintained.

Improving workers' nutritional status – regardless of food service available – is one of WFP's goals and food education is aimed at encouraging companies to engage in an ongoing education process, incorporating from the Brazilian diet positive changes and aspects of current food consumption. The purpose of the present study is to assess the existing meal model and food intake of the clientele served in WFP-affiliated eating places.

METHODS

Sampling was based on the official listing from the Ministry of Labor and Employment (MLE) of all WFP-affiliated eating places in Brasília, Federal District. MLE listing was also linked to the listing of all eating places registered in the 1st Regional Board of Nutrition (RBN-1). FNUs were classified as low, medium and large-size according to the number of meals served (MLE data). After statistically calculating a single random sample at a 5% absolute error margin, a representative sample comprising 1,044 subjects of 52 FNUs, who attended WFP-affiliated eating places in Brasília, was established. A cross-sectional study was carried out and data were collected from October 2000 to September 2001.

Assessment of food intake was carried out during lunch time. First, before opening hours, the standardization of mean weight of food served was conducted using FNU own cutlery. Three servings of each food were obtained using three different measures: spoonful, medium, level spoon, or large, medium, and small size. FNU scales were used for food weighting and, when a scale was not available, an electronic precision scale with 2 kg maximum capacity and 0.01 g accuracy was used.

After signing an informed consent form, participating subjects had their lunch food intake assessed by direct observation. Dish composition was carried out without the observation group's involvement. This process was carefully monitored, and all food and servings were recorded in an appropriate form. When dish composition was over, each dish was weighted and labeled in the bottom side to allow for subsequent calculation of the leftover/intake index using Gandra & Gambardella[5] formula.

Based on direct observation records of dish composition, lunch intake was calculated in grams. There were two final weights: a scale-measured weight and an estimated weight from records of client servings. When the difference between observed and estimated weights exceeded 5%, the observed weight was replaced by the weight calculated in the following equation:

Observed weight = 2.47953 + 0.01388 WFP + 0.95225 estimated weight

The adjustment above was obtained by applying the method of minimum squares (R^2=92.2%) using crude data of 1,044 subjects. To control for the effect of experience gaining by the observation group recording dish composition and weighting, a so-called WFP variable was included in the statistical analysis, indicating the ascending order of observations from WFP 1 to WFP 1,044 and including all subjects in the analysis.

The Virtual Nutri software, version 1.0,[14] was used in the nutritional assessment. In the nutritional assessment of the meal, energy intake, macronutrient percent energy as well as micronutrients such as iron, calcium, zinc, vitamin C and A were analyzed. Cholesterol and fibers were also studied. The choice of the micronutrients studied was based on their bioavailability and known association with public health conditions in Brazil.

The net dietary protein-calorie index (NDPcal%), which indicates the percentage of net protein over total calories in the menu, was calculated. The NDPcal is given by crude protein content multiplied by factors included in MLE regulations and it should be at least 6% regardless of the job, which ensures adequate protein utilization.[12]

Before dish composition, subjects were asked to take off their shoes, coats or any clothing item that could be taken off, as well as heavy items they had in their pockets, and they were positioned erect with the ear-eye plane parallel to the floor (Frankfurt plane), eyes focused forward and arms relaxed.[8] A Soenhle scale (manufactured in Germany) with 150 kg capacity and 100 g accuracy and a infra-red reading Soenhle stadiometer with 1 cm accuracy were used. The Body Mass Index (BMI) was

calculated using the following formula: BMI = weight (kg)/height^2 (m). The World Health Organization (WHO) BMI classification was applied.[17]

The Epi Info software was used for creating database. Statistical data were presented as medians, means and standard deviations. The Chi-square (χ^2) test was used to analyze different variables by sex. The Mann-Whitney and Kruskal-Wallis tests were used to calculate nutrient medians. A 5% level of significance was set. When needed, multiple comparisons were performed using Bonferroni method. All data were double checked.

The study was approved by the *Universidade de Brasília* Human Research Ethics Committee according to the National Health Board Decree 196/96.[2]

RESULTS

Table 1 shows that 88% of the study population aged between 20 and 50 years, 60% were men, and of them, most were married men aging less than 34 years.

More than 50% of the study population had an income greater than five minimum wages, 63% in women and 37% in men. Two-thirds had attended or completed high school, describing a population of good education level. There was no statistically significant differ-

ence of income distribution but lower schooling was more frequently seen among men. Excess weight was seen in both men and women, 48.1% and 35.1% respectively, and a higher prevalence of overweight and obesity was found among men.

It was found that study subjects were regulars at lunch time of the eating places studied with mean attendance of 4.6 days a week and median of 5.0 days. Table 2 shows medians of nutrients studied that were ingested during lunch. Median energy intake was below the WFP recommendation, ranging from 1,200 to 1,600 kcal, a deficit of more than 800 kcal given the 1,400 kcal intake standard recommendation. Median energy intake was 515 among women and 737 among men.

Fiber intake by sex (Table 2) was statistically different, ranging from 6.0 g to 8.3 g. In addition, iron, calcium, zinc, and cholesterol intake was lower among women (p<0.001). There were no significant differences in protein, vitamin C and A intake.

The analysis by age group showed a reduction in total energy intake, proteins, and iron as age increased (p<0.001). Multiple comparisons of total energy and protein intake did not show significant differences except in the age group 35-49 years. As for iron intake, a significant difference was found when comparing the age group 35-49 years to 20-34 years. All

Table 1 - Socioeconomic characteristics, education and nutritional status of workers enrolled in WFP. Brasília, Brazil, 2000-2001.

Variables		Female		Male		Total		p-value*
		N	%	N	%	N	%	
Age group								
	<20	22	5.3	21	3.3	43	4.1	0.017
	20-34	207	50.2	376	59.6	583	55.8	
	35-49	150	36.3	186	29.5	336	32.2	
	≥50	34	8.2	48	7.6	82	7.8	
	Total	413	100	631	100	1,044	100	
Marital status								
	Partner	182	44.3	371	58.9	553	53.1	0.000
	No partner	229	55.7	259	41.1	488	46.9	
	Total	411	100	630	100	1,041	100	
Income***								
	<2 minimum wages	52	10.7	84	13.4	136	13.1	0.0829
	2-4 minimum wages	100	24.5	184	29.3	284	27.3	
	5-6 minimum wages	44	10.8	89	14.1	133	12.8	
	7-8 minimum wages	39	9.5	57	9.1	96	9.3	
	≥9 minimum wages	174	42.5	214	34.1	388	37.4	
	Total	409	100	628	100	1,037	100	
Schooling								
	0-4 grade	24	5.8	37	5.9	61	5.8	<0.0001
	5th-8th grades	65	15.7	162	25.7	227	21.7	
	High school	177	42.9	292	46.3	469	44.9	
	University	112	27.1	117	18.5	229	21.9	
	Graduate school	35	8.5	23	3.6	58	5.5	
	Total	413	100	631	100	1,044	100	
BMI	<18.5	17	4.1	12	1.9	29	2.8	0.0001
	18.5-24.9	251	60.8	315	49.9	566	54.2	
	25.0-29.9	110	26.6	242	38.3	352	33.7	
	≥30.0	35	8.5	62	9.8	97	9.3	
	Total	413	100	631	100	1,044	100	

*χ^2 test
**Minimum wage: R$180.00 (US$ 65)

Table 2 - Lunch assessment of workers enrolled in Worker's Food Program according to mean values of energy, macro and micro nutrients intake. Brasília, Brazil, 2000-2001.

Variables	Total energy intake (kcal)	Prot (g)	Fe (mg)	Ca (mg)	Vit. C (mg)	Vit. A (mg)	Zn (mg)	Cholesterol (mg)	Fibers (g)
Gender									
Female	515	28.8	4.3	99.6	34.3	354.6	2.2	66.6	6.0
Male	737	41.5	6.2	125.5	27.7	233.3	3.5	93.5	8.3
p-value*	<0.001	0.998	<0.001	<0.001	0.140	0.207	<0.001	<0.001	<0.001
Age group									
<20	737	38.0	5.7	116.2	31.4	148.7	3.4	86.1	7.8
20-34	690	36.3	5.5	116.9	27.9	246.0	3.0	83.2	7.5
35-49	596	35.0	5.1	113.3	31.9	319.7	2.9	83.3	7.0
≥50	548	36.2	4.8	106.3	34.9	296.6	3.4	85.0	7.2
p-value**	<0.001	<0.001	<0.001	0.101	0.175	0.136	0.343	0.958	0.250
BMI									
<18.5	569	27.4	4.4	105.9	27.6	228.3	1.9	62.3	6.6
18.5-24.9	678	35.3	5.3	113.8	27.8	260.6	2.9	78.9	7.6
25.0-29.9	649	37.9	5.6	117.6	32.9	252.1	3.3	92.3	7.2
≥30	605	38.7	5.3	118.8	30.0	307.7	2.8	97.9	6.9
p-value**	0.148	<0.001	0.142	0.401	0.451	0.786	0.302	<0.001	0.677

*Mann-Whitney test
**Kruskal-Wallis test

other nutrient intake did not show any significant age difference.

In regard to the nutritional assessment of lunch and study population nutritional status (Table 2), lower energy intake was associated to subjects with BMI <18.5 kg/m² and BMI ≥30.0 kg/m². A small difference was seen in different BMIs and it was of about 100 kcal between the lowest and the highest BMIs.

Median fiber intake was reduced from BMI <18.5 kg/m². Cholesterol and protein intake increased as BMI increased (p<0.0001). Bonferroni test showed a significant cholesterol difference in subjects with BMI 18.5-24.9 compared to BMI 25.0-29.9. Protein intake was significant different when comparing subjects with BMI ≥30 to those with BMI <18.5. There were no differences for all other nutrients.

Table 3 shows increased energy intake from protein and reduced carbohydrate intake across age groups and BMIs (p<0.001). A significant difference was seen in energy intake from protein and carbohydrates between subjects aging 35-49 years and those aging 20-34 years. The observed increased fat intake was not significant. It also shows a significant difference by sex in energy intake from protein and carbohydrates, which was higher among men.

Table 4 illustrates that net protein percentage over total energy intake is frequently above 12% in all FNUs but it was remarkably higher in medium-sized units. The WFP recommendation is at least 6%.

Table 5 underlines that menus prioritize salads made of cooked instead of raw vegetables in all units. As for protein food, beef and chicken are most frequently served and the former is more common in

medium and large-sized units. Regarding their preparation, protein was more often cooked or fried.

Side dishes served were more often pasta (46%) and toasted manioc flour/polenta (38%), and less frequently (mostly fried) vegetables.

As desserts, sweets counted for more than 60%; only small-sized units served more fruits. On-site observation of small-sized FNUs revealed a wider variety of fruits offered but sweets were available in larger amounts. Artificial juices accounted for more than 80% of beverage offered.

DISCUSSION

Brazilian education has improved in the last decade. According to the 2000 Demographic Census,[7] more developed regions, such as the Midwestern region, have achieved better education levels,[6]

Table 3 - Lunch assessment of workers enrolled in WFP according to their mean energy intake from macronutrients. Brasília, Brazil, 2000-2001.

Variables	% kcal		
	Protein	Carbohydrate	Lipid
Age group			
<20	18.0	57.7	22.6
20-34	20.9	51.5	24.7
35-49	22.7	49.1	25.3
≥50	24.0	47.3	26.1
p-value**	<0.001	<0.001	0.316
BMI			
<18.5	18.6	56.2	23.5
18.5-24.9	20.3	52.2	24.0
25.0-29.9	22.9	47.9	25.6
≥30.0	24.2	45.9	26.7
p-value**	<0.001	<0.001	0.144
Gender			
Female	21.3	49.0	24.9
Male	21.7	51.3	24.8
p-value*	<0.001	<0.001	0.154

*Mann-Whitney test
**Kruskal-Wallis test

Table 4 - Assessment of lunch NDPcal % of workers enrolled in WFP according to Food and Nutrition Units size. Brasília, Brazil, 2000-2001.

NDPcal%	FNU size			
	Low	Medium	High	Total
Minimum	14.1	12.7	13.4	13.4
Mean	16.4	16.3	15.2	16.0
95% CI	14.1-18.79	14.24-18.36	13.86-16.54	13.94-18.06
Maximum	19.2	22.3	17.1	19.5

which is corroborated in the present study. Moreover, Veloso & Santana[16] reported that WFP workers had higher schooling when compared to those who are not enrolled in the program. The study findings showed, in Brasília, a higher proportion of women of higher schooling (78.5%) than men (68.4%). On the other hand, men are usually younger than women. More than 50% of the study population earned more than five minimum wages, 63% of women and 37% of men.

Overweight and obesity were more prevalent and evident among men stressing the need of assessing factors, among others, related to their eating pattern. Data showed that 43% had excess weight, 48.1% in men and 35.1% in women. In the last decades, Brazil has also showed increasing prevalence of excess weight. Eating pattern changes and increased physical inactivity has been pointed out as contributing factors. A comparison between the 1974/75 National Study of Familiar Expenditures (ENDEF) data with the 1989 National Study on Health and Nutrition (PNSN) data suggest overweight growth among men and women, 58% and 42% respec-

tively, and obesity growth of more than 100% in men and more than 70% in women. It has been evidenced a rapidly increase of obesity in men, though obesity is still more prevalent among women. Excess weight found in the PNSN was 27% in men and 38% in women, 33% in overall overweight.[7]

The nutritional analysis of lunch by age groups showed a reduction of median intake of some nutrients as age increased. In contrast, several adverse social, biological and environmental factors have contributed, for instance, to increased protein intake by elder people.

There was also reduced energy intake from carbohydrates and proportional increased fat intake as age and BMI increased. This trend could be explained by the fact that increasing life expectancy has paralleled with increased non-transmissible chronic diseases generally associated to inadequate eating habits and high fat intake. The association of diseases and excess weight indicate the need for nutritional prevention to avoid this problem.

Table 5 - Qualitative description of standard lunch menus according food preparation frequency and Food and Nutrition Units size. Brasília, Brazil, 2000-2001.

Food preparation	Food and Nutrition Units size							
	Low		Medium		High		Total	
	N	%	N	%	N	%	N	%
Salads								
Cooked vegetables	24	63.1	97	67.8	23	65.7	144	66.7
Raw vegetables	14	36.9	46	32.2	12	34.3	72	33.3
Total	38	100	143	100	35	100	216	100
Protein dishes								
Beef	7	36.8	44	38.3	13	41.9	64	38.8
Chicken	8	42.1	38	33.0	11	35.5	57	34.5
Fish	–	–	16	13.9	4	12.9	20	12.1
Pork	4	21.1	17	14.8	3	9.7	24	14.5
Total	19	100	115	100	31	100	165	100
Preparation mode								
Cooked	6	30	42	38.5	11	35.5	59	36.9
Fried	7	35	25	22.9	5	16.1	37	23.1
Roasted	3	15	27	24.8	10	32.3	40	25.0
Grilled	4	20	15	13.8	5	16.1	24	15.0
Total	20	100	109	100	31	100	160	100
Side dishes								
Pasta	6	42.8	21	43.7	8	57.1	35	46.0
Toasted manioc flour/polenta	4	28.6	21	43.7	4	28.6	29	38.1
Vegetables	4	28.6	6	12.6	2	14.3	12	15.9
Total	14	100	48	100	14	100	76	100
Dessert								
Fruits	14	60.9	48	31.8	16	39.0	78	36.3
Sweets	9	39.1	103	68.2	25	61.0	137	63.7
Total	23	100	151	100	41	100	215	100
Juices								
Artificial	2	66.6	31	83.8	6	75.0	39	81.3
Natural	1	33.4	6	16.2	2	25.0	9	18.7
Total	3	100	37	100	8	100	48	100

High protein content was seen in the workers' dish composition during lunch. But after assessing WFP menus in São Paulo, Gambardella[4] found inadequate protein and carbohydrate content in relation to total energy intake.

In the present study NDPcal% was calculated based on subject's actual intake their preference for protein food was evidenced as NDPcal% in all FNUs was above the minimum 6% recommended in WFP. Other studies on NDPcal% were not based on subject's actual intake but either on intake estimation of the meal to be served, reporting only that calculated percentages were over 6% and could be as high as 10.5%.[3]

The study showed that pasta and meat were most commonly included in the standard menu of self-service. Carbonated beverages were the first choice of drinking. The 1995-96 Survey on Family Income also showed an increased consumption of non-alcoholic beverages (carbonated beverages).[14] In Brasilia FNUs, artificial juice was mostly consumed and usually served free.

The regular lunch served in FNUs confirmed rice and beans to be basic food items of Brazilian eating pattern, which corroborates Schieri[15] and Mattos and Martins[9] findings. Evidencing a nationwide trend, pay-by-weight self-service was the form of service found in 50 out of 52 units studied in Brasília.

Basic food, such as rice and beans, are major to fiber intake. This is important because other food served had low content of dietary fibers and raw vegetable salads and vegetable side dishes were also not often consumed. In contrast, pasta and flour-based side dishes were more often served as well as larger amounts of sweets as dessert. The National Study on Family Expenditures (ENDEF) had already identified in the 1970's low fiber intake in the diet of Brazilians living in the capitals Rio de Janeiro, São Paulo, and Porto Alegre.[9]

According to data from the 1995-96 Survey on Family Income,[13] there has recently been a significant increase in protein (beef and chicken) intake because of its low cost. This was also evidenced by the greater availability of such protein food in the study, especially in medium- and large-sized units, most probably due to their increased logistic and purchase capacity. Abreu[1] reported that most consumed food in self-services in São Paulo is meat and pasta, similar to that found in this study.

Based on the study findings and bearing in mind the WFP goals, there is a need for developing actions to help monitoring the WFP impact through nutritional profiling of these clientele. The first step was the adoption of the lowest and the highest energy intake for main meals according to the workers' level of physical activity and occupation.[12]

This study findings point out to the need of effective food and nutritional education interventions promoting redirection of eating preferences and healthier food choices by FNU regulars. The program should strongly stress a more holistic approach where nutritional directives would be the starting point for actual education actions to health promotion.

Workers view such programs as a means of pay compensation. However, these programs should also be seen as health promoters.

Thus, health promotion strategies to improve quality of life should be encouraged. The Ministry of Health stated in the recent National Program on Food and Nutrition[11] the need for further studies on Brazilian eating pattern and, more specifically, on the population involved in government programs such as WFP.

These populations should be targeted in health promotion strategies. Nutritionists should act as educators and perform their specific tasks, working in FNUs to effectively fulfill their role together with health providers.

REFERENCES

1. Abreu ES. Restaurante "por quilo": vale quanto pesa? Uma avaliação do padrão alimentar em restaurantes de Cerqueira César, São Paulo, SP [dissertação]. São Paulo: Faculdade de Saúde Pública da Universidade de São Paulo; 2000.

2. Brasil. Ministério da Saúde. Conselho Nacional de Saúde. Comissão Nacional de Ética em Pesquisa. Resolução 196/96. Brasília (DF); 1966.

3. Freire RBM, Salgado RS. Avaliação de cardápios oferecidos a trabalhadores horistas. Mundo Saúde 1998;22(5):298-301.

4. Gambardella AMD. O programa de alimentação do trabalhador frente às recomendações nutricionais para esse segmento específico da população: área metropolitana de São Paulo [dissertação] São Paulo: Faculdade de Saúde Pública, Universidade de São Paulo; 1990.

5. Gandra YR, Gambardella AMD. Avaliação de serviços de nutrição e alimentação. São Paulo: Sarvier; 1986. p. 113.

6. Instituto Brasileiro de Geografia e Estatística. Censo demográfico: tabulação avançada do censo demográfico 2000. Resultados preliminares da amostra. Rio de Janeiro; 2002.

7. Instituto Nacional de Alimentação e Nutrição, Instituto de Pesquisa Econômica e Aplicada, Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional sobre Saúde e Nutrição; 1989. Condições nutricionais da população brasileira: adultos e idosos. Brasília (DF); 1991.

8. Jellife DB. Evaluación del estado de nutrición de la comunidad. Genebra: OMS; 1968. (Série de monografias, 53)

9. Mattos LL, Martins IS. Consumo de fibras alimentares em população adulta. *Rev Saúde Pública* 2000;34:50-5.

10. Mazzon JA. Programa de alimentação do trabalhador: 25 anos de contribuições ao desenvolvimento do Brasil. São Paulo: Fundação Instituto de Administração da Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo; 2001.

11. Ministério da Saúde. Política nacional de alimentação e nutrição. Brasília (DF); 1999.

12. Ministério do Trabalho e Emprego. Programa de alimentação do trabalhador*:* legislação. 4º ed. Brasília (DF); 2001.

13. Monteiro CA, Mondini L, Costa RBL. Mudanças na composição e adequação nutricional da dieta familiar nas áreas metropolitanas do Brasil (1988-1996). *Rev Saúde Pública* 2000;34:251-8.

14. Philippi ST, Szarfarc SC, Latterza AR. *Virtual Nutri* [programa de computador]. Versão 1.0 for Windows. São Paulo: Faculdade de Saúde Pública da Universidade de São Paulo. Departamento de Nutrição; 1996.

15. Sichieri R. Epidemiologia da obesidade. Rio de Janeiro: Editora da Universidade do Rio de Janeiro; 1998. p. 140.

16. Veloso IS, Santana VS. Impacto nutricional do programa do trabalhador no Brasil. *Rev Panam Salud Publica* 2002;11(1)24-31.

17. World Health Organization [WHO]. Physical status: the use and the interpretation of an anthropometry: report of a WHO expert comitee. Genebra; 1995. (WHO Technical Report Series, 854).