

Food Preferences and Prevalence of Elevated Body Mass Index and Blood Pressure Among Cagayanos: Implications to Community Health Extension Program

By

MILAGROS CAGAYAN-SUYU, RND, Ph.D.

College of Hospitality Industry Management

Cagayan State University, Andrews Campus, Tuguegarao City, Philippines

(+63) 9358747712

Email: milasuyu2000@yahoo.com

ABSTRACT

The preference for specific flavors are determined by innate factors, environmental influences, economic status, etc. The growing prevalence of overweight, obesity and hypertension among individuals has become a matter of national concern because of its relationship to a rise in non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes mellitus and certain cancers. The study evaluated the food preferences and the prevalence of elevated body mass index (BMI) and blood pressure among 2552 Cagayanos. Food preferences among respondents is considered healthy as it contains a balanced combination of foods coming from the Food Guide Pyramid. The overall prevalence of BMI 25kg/m² to 30kg/m² which composed the overweight category was 504(19.75%) and the obese group who have body mass indices of 30kg/m² or greater constituted 2.51% of the study group. The prevalence of elevated blood pressure was 15.99%. Respondents have healthy food preferences. While it is true that respondents with healthy or normal BMI and blood pressure outnumber those with elevated BMIs and blood pressures, the findings demonstrate the important role of the Allied Health Department, as part of the school's community health extension program, in conducting health and nutrition education focusing on healthy lifestyles to prevent diet-related diseases. In addition, the conduct of studies correlating food preferences with BMI and hypertension is highly recommended.

Key words: Food Preferences, Elevated BMI, Elevated BP, Community Health Extension, Prevalence

1. Introduction

All human senses are established in the embryonic phase. It is shaped as early as first to four weeks of gestation and continues throughout our lives. Factors contributing to our food choices include, but are not limited to, environment, usual family food, economic status, peer influence, etc.

BMI, or body mass index, correlates a person's height and weight. It is important for diagnosing overnutrition or undernutrition. Hypertension, more commonly referred to as high blood pressure, is one of the commonest cardiovascular disorders worldwide. Our body weight has an important impact on our risks for hypertension.

Lifestyle and behavior are central to the maintenance of health and wellness. Achieving wellness is an ongoing process. To influence lifestyle and behavior, health professionals need to take into account the values, attitudes, culture and life circumstances of individuals (Grodner, 2004)

The present study evaluates the food preferences and the prevalence of elevated BMI and blood pressure among Cagayanos. Findings of the study would serve as basis in designing community health extension program.

1.1 Objectives of the Study

The study aims to determine the food preferences and prevalence of elevated body mass index (BMI) and blood pressure among Cagayanos. Specifically, it tries to determine the socio-demographic profile of the respondents, their food preferences for breakfast, lunch, dinner and snacks, the prevalence of elevated BMI, and the prevalence of elevated blood pressure among the respondents.

1.2 Development of Food Preferences

During the past decade, experimental studies revealed that the environment in which the human fetus lives, the amniotic sac, changes as a function of the food choices of the mother since dietary flavors are transmitted in the amniotic fluid (Mennella, Johnson, & Beauchamp, 1995). Experiences with such flavors lead to increased enjoyment and preference for these flavors at birth and during weaning. For example, exposure to dietary transmitted flavors such as garlic or anise in amniotic fluid has been shown to influence the newborn's facial, mouthing, and orienting responses to those odors immediately postpartum (Hepper, 1988; Schaal, Marlier, & Soussignan, 2000). Some of these same flavors will later be experienced by infants in their mother's milk since human milk is composed of flavors which directly reflect the foods, spices and beverages ingested by the mother (Mennella & Beauchamp, 1991; Mennella et al., 1995).

Social scientists have developed different conceptual frameworks of food choice behavior. Theoretical models of behavior incorporate both individual and environmental factors affecting the formation or modification of behaviors (Nestle, Marion, et al., 2009).

There is a substantial amount of research indicating that the presence of others influences food intake (discussed below). In reviewing this literature, Herman, Roth, and Polivy (2009) have outlined three distinct effects:

Social facilitation – When eating in groups, people tend to eat more than they do when alone.

In daily diary studies, individuals have been found to eat from 30 to 40-50 percent more while in the presence of others versus eating alone. In fact, some research has indicated that the rate of intake is best described as a linear function of the number of people present, such that meals eaten with one, four, or seven other people were 33, 69, and 96 percent larger than meals eaten alone, respectively. In addition to these observational findings, there is also experimental evidence for social facilitation effects.

Meal duration may be an important factor in social facilitation effects; observational research has identified positive correlations between group size and meal duration, and further investigation has confirmed meal duration as a mediator of group size-intake relationships.

Modeling – When eating in the presence of others who consistently eat either a lot or a little, individuals tend to mirror this behavior by also eating either a lot or a little.

Early studies of modeling effects investigated food intake alone versus in the presence of others who either ate either a very small amount (1 cracker) or a larger amount (20-40 crackers). Findings

were consistent, with individuals consuming more when paired with a high-consumption companion than a low-consumption companion, whereas eating alone was associated with an intermediate amount of intake. Research manipulating eating social norms within real-life actual friendships has also demonstrated modeling effects, as individuals ate less in the company of friends who had been instructed to restrict their intake versus those who had not been given these instructions. Furthermore, these modeling effects have been reported across a range of diverse demographics, affecting both normal-weight and overweight individuals, as well as both dieters and non-dieters. Finally, regardless of whether individuals are very hungry or very full, modeling effects remain very strong, suggesting that modeling may trump signals of hunger or satiety sent from the gut.

Impression management – When people eat in the presence of others who they perceive to be observing or evaluating them, they tend to eat less than they would otherwise eat alone.

Leary and Kowalski (1990) define impression management in general as the process by which individuals attempt to control the impressions others form of them. Previous research has shown that certain types of eating companions make people more or less eager to convey a good impression, and individuals often attempt to achieve this goal by eating less (Herman, 2003) For example, people who are eating in the presence of unfamiliar others during a job interview or first date tend to eat less.(Pliner,1990)

In a series of studies by Mori, Chaiken and Pliner, individuals were given an opportunity to snack while getting acquainted with a stranger(Mori,1987). In the first study, both males and females tended to eat less while in the presence of an opposite-sex eating companion, and for females this effect was most pronounced when the companion was most desirable. It also seems that women may consume less in order to exude a feminine identity; in a second study, women who were made to believe that a male companion viewed them as masculine ate less than women who believed they were perceived as feminine.

The weight of eating companions may also influence the volume of food consumed. Obese individuals have been found to eat significantly more in the presence of other obese individuals compared to normal-weight others, while normal-weight individuals' eating appears unaffected by the weight of eating companions.

Awareness Although the presence and behavior of others can have a strong impact on eating behavior, many individuals are not aware of these effects, and instead tend to attribute their eating behavior primarily to other factors such as hunger and taste. Relatedly, people tend to perceive factors like cost and health effects as significantly more influential than social norms in determining their own fruit and vegetable consumption.

1.2. Body Mass Index

Body mass index (BMI) is an estimate of body composition that correlates an individual's weight and height to lean body mass. The BMI is thus an index of weight adjusted for stature. Body mass index is figured by dividing weight in kilograms by height in meters squared and multiplying by 100. It can also be figured by dividing weight in pounds by height in inches squared and multiplying by 705. High values can indicate excessive fat stores, while low values can indicate reduced fat stores (Nieto,1992)

1.3 Hypertension

Hypertension or high blood pressure is a condition in which the blood pressure in the arteries is chronically elevated. With every heart beat, the heart pumps blood through the arteries to the rest of the body. Blood pressure is the force of blood that is pushing up against the walls of the blood vessels. If the pressure is too high, the heart has to work harder to pump, and this could

lead to organ damage and several illnesses such as heart attack, stroke, heart failure, aneurysm, or renal failure. (<http://www.medicalnewstoday.com/articles/150109.php>)

According to Medilexicon's medical dictionary, hypertension means *"High blood pressure; transitory or sustained elevation of systemic arterial blood pressure to a level likely to induce cardiovascular damage or other adverse consequences."*

The normal level for blood pressure is below 120/80, where 120 represent the systolic measurement (peak pressure in the arteries) and 80 represents the diastolic measurement (minimum pressure in the arteries). Blood pressure between 120/80 and 139/89 is called prehypertension (to denote increased risk of hypertension), and a blood pressure of 140/90 or above is considered hypertension.

Though the exact causes of hypertension are usually unknown, there are several factors that have been highly associated with the condition. These include: Smoking Obesity or being overweight Diabetes, Sedentary lifestyle, Lack of physical activity High levels of salt intake (sodium sensitivity), insufficient calcium, potassium, and magnesium consumption, Vitamin D deficiency, High levels of alcohol consumption, stress, aging, medicines such as birth control pills, genetics and a family history of hypertension, chronic kidney disease ,adrenal and thyroid problems or tumors

Statistics in the USA indicate that African Americans have a higher incidence of hypertension than other ethnicities.

2. Methods

As part of the school's marketing plan and community extension program, the Allied Health Department, headed by the faculty, conducted a medical mission with the theme :Ngayong Buwan ng Puso, 'Wag Kang High Blood'(This Heart's Month, Do not be Hypertensive) for three consecutive school years , SY 2008-2009, 2009-2010 and 2010-2011. Included in this medical mission was the taking of blood pressure, height, weight, assessment of food preferences and diet counseling. Two weeks prior to the medical mission, permission to conduct the activity in the two big malls in Tuguegarao City, Cagayan, Philippines. - Paseo Reale and Brickstone Mall, was sought from the mall managers.

2.1 Subjects

Recipients to this outreach program served as the subjects of this study. They were the mall goers who availed of AMAs free services. They come from the different towns of Cagayan like Enrile, Solana, Amulung, Aparri, Gonzaga, Alcala, Tuguegarao City and the nearby towns of Isabela. To get the body mass index (BMI) of the subjects, their heights and weights were measured following the procedures that follow:

2.2. Data Collection

2.2.1 Food Preferences

A food preferences survey checklist was given to the respondents to accomplish. They were asked to read the directions provided. The questionnaires were completely anonymous to the participants. The food choices used in the survey questionnaire included most typical foods used as menu options at home and in most restaurants. The questionnaire was piloted among 20 Allied Health students for readability and improvement.

2.2.2. Height Measurement

A meter stick is attached to the wall. The subjects were advised to stand with feet flat, together, and against the wall, legs straight, arms at sides, and shoulders are level, looking straight ahead and the line of sight parallel with the floor. A flat headpiece to form a right angle with the

wall is used lowering the headpiece until it firmly touches the crown of the head while lightly marking where the bottom of the headpiece meets the wall, to get the height measurement.

2.2.3. Weight Measurement

The bath scale was positioned on firm flooring. The clients were requested to remove their shoes and heavy clothing, such as sweaters, and to empty their pockets of heavy objects, and to stand with both feet in the center of the scale. Weights were recorded to the nearest decimal fraction. Their BMI were determined using the BMI Tables, Heights were converted to centimeters and weights converted to pounds. Computed BMIs were compared to the BMI Tables to determine their nutritional status.

2.2.4. Blood Pressure Measurement

Blood pressure was measured on left arm by auscultatory method using mercury sphygmomanometer. The individual was made comfortable and seated at least for five minutes in the chair before measurement. Blood pressure was categorized, with the help of the school nurse, as follows: normotensive, prehypertensive and hypertensive. Data collected from these three medical mission sessions were tabulated, analyzed and interpreted using simple frequency count and percent distribution.

3. Results and Discussion

A total of 2552 subjects participated in the study. They were the mall goers who availed of the free services offered by AMACC, Tuguegarao City campus.

3.1. Socio-demographic characteristics

Table I shows three socio-demographic characteristics of respondents stratified by sex. Two thousand one hundred fifty two (84.33%) of the respondents are from Cagayan, 346 (13.57%) are from Isabela, and only 54 (2.12%) come from other places like Manila, Quezon Province and Kalinga. Of the 2552 subjects, 1249(48.94%) are male while 1303 (51.06%) are female. Majority of the respondents, 1411 (55.29%) come from ages 41-65, while 878 (34.40%) come from 20 -40 years age bracket. Adolescents and older adults comprise 250 (9.80%) and 13 (0.51%) subjects, respectively.

Table 1

Description of Selected Socio-demographic Characteristics of Subjects

Residence	Male	Female	Total	
			Frequency	Percent
Cagayan	1176	976	2152	84.33
Isabela	64	272	336	13.17
Other Places	9	55	64	2.51
Sex	1249	1303		

Age					
13-19 y/o (adolescents)	106	144	250	9.80	
20-40 y/o (early adults)	390	488	878	34.40	
41-65 y/o (middle adults)	747	664	1411	55.29	
66 and older (older adults)	6	7	13	0.51	

Table II
Food Preferences of Respondents for Breakfast

Breakfast	Mean	Rank	Adjectival Description
Rice, coffee	1.05	12	seldom
Bread, coffee with or without milk or cream	2.38	7	Sometimes
Bread with spread, coffee or milo	2.92	6	Often
Rice, left-over foods	2.24	8	sometimes
Noodles	3.03	5	Often
Noodles with Egg	3.36	4	always
Rice, canned/processed foods	3.57	1	always
Rice, dried fish, coffee with or without milk	3.41	3	always
Rice, omelet, coffee	3.46	2	always
Soup	1.25	11	seldom
Arroz Caldo	1.68	10	seldom
Champorado	1.79	9	sometimes

Breakfast preference among respondents which is described as “always” eaten include a combination of rice-canned/processed food, rice-omelette-coffee, rice-dried fish-coffee, and noodle with egg, which ranked first, second, third and fourth, respectively. It must be noted that these food choices are rich in sodium and fat, too, since processed food, dried fish and omelet are always cooked fried.

Table III
Food Preferences of Respondents for Lunch

Lunch	Mean	Rank	Adjectival Description
Rice, vegetables	2.88	6	often
Rice, vegetables, fruits	2.72	8	often
Rice, vegetables, soft drinks	2.49	9	Sometimes
Rice, vegetables, juice	2.45	10	Sometimes
Rice, meat, vegetables, soft drinks	3.31	2	always
Rice, meat, vegetables, water	3.37	1	always
Rice, meat, soft drinks	3.03	4	Often
Rice, meat, water/juice	2.78	11	Often

Rice, meat, vegetables, fruit/dessert	2.92	5	Often
Rice, meat, vegetables, fruit/dessert, soft drinks	3.28	3	Often
Rice, fish, vegetables, dessert	2.79	7	Often
Rice, fish, dessert	1.88	13	Sometimes
Rice, fish, juice/water	1.21	14	Seldom
Rice, fish, soft drink	2.08	12	Sometimes
Rice, noodles	0.22	15	Never

Food preferences for lunch include, ranked first, rice-meat-vegetable combination with water as the beverage. Rice-meat-vegetable combination with soft drink as the beverage ranked second. Only these two combinations were described “always” eaten by the subjects. Most of the food combinations are “often” and “sometimes” eaten.

Table IV
Food Preferences of Respondents for Dinner

Dinner	Mean	Rank	Adjectival Description
Rice, vegetables	2.88	5	Often
Rice, vegetables, fruits	2.71	7	Often
Rice, vegetables, soft drinks	2.52	8	Often
Rice, vegetables, juice	2.42	9	Sometimes
Rice, meat, vegetables, soft drinks	1.84	13	Sometimes
Rice, meat, vegetables, water	3.29	1	Always
Rice, meat, soft drinks	2.29	10	Sometimes
Rice, meat, water/juice	3.03	2	Often
Rice, meat, vegetables, fruit/dessert	2.92	4	Often
Rice, meat, vegetables, fruit/dessert, soft drinks	3.00	3	Often
Rice, fish, vegetables, dessert	2.79	6	Often
Rice, fish, dessert	1.88	12	Sometimes
Rice, fish, dessert	1.25	14	Seldom
Rice, fish, juice/water	1.95	11	Sometimes
Rice, fish, soft drink	0.98	15	never
Rice, noodles			

As shown in the table, topping in the list is the rice-meat-vegetable combination, with water or juice as the beverage. It is revealed in Tables III and IV that the rice-meat-vegetable combination is the preferred food for both lunch and dinner. “Seldom” eaten for dinner is the rice-fish combination.

Evaluating the food preferences for lunch and dinner indicates a balanced assortment of nutrients coming from the different food groups. Protein, vitamins, minerals and fat from the meat, precious amount of vitamins from the vegetables, and carbohydrates from rice.

Table V
Food Preferences of Respondents for Snacks

Snacks	Mean	Rank	Adjectival Description
Breads, cakes, cookies, biscuits, juices	3.05	2	Often
Noodle, pasta, soft drink	2.67	3	Often
Banana cue, camote cue, ukoy, juice	3.28	1	Always
Pizza, soft drink	2.21	4	Sometimes
Pizza, juice	1.99	5	Sometimes
Sweet fruits	0.95	7	never
Sour fruits	0.86	8	never
Native kakanin	1.77	6	Sometimes

For the subjects' snack preferences, common and cheap but heavy snacks prevail. This include banana cue(fried banana with sugar), camote cue(fried sweet potato with sugar), ukoy(mongo sprout patty) and juice. All these three items are fried and so they contain high amount of fat.

Table VI
BMI Scores of Respondents Stratified by Sex

BMI Scores	Nutritional Status	Male	Female	Total	
				F	%
Below 18.5	Underweight	80	144	224	8.78
18.5-24.99	normal	754	1006	1760	68.97
25-30	Overweight	406	98	504	19.75
Above 30	Obese	9	55	64	2.51
TOTAL		1249	1303	2552	100.00

Table VI shows that there are 224 (8.78%) respondents with a BMI below 18.5 kg/m² described as "underweight". Of this, there are 80 males and 144 females. One thousand seven hundred sixty (68.97%) belong to BMI score of 18.5 kg/m²-24.99 kg/m², described as "normal" nutritional status. "Overweight" respondents with BMI scores of 25kg/m²-30 kg/m² totals 504(19.75%), with the male comprising the majority of the overweight respondents. Only 64 (2.51%) respondents are "obese" having a BMI score of above 30kg/m². It is worthy to note that majority of the respondents have normal nutritional status based on their BMI scores.

Table VII
Blood Pressure of Respondents Stratified According to Sex

Sex	Normotensive		Prehypertensive		Hypertensive		TOTAL	
	F	%	F	%	F	%	F	%
	Male	1096	42.95	184	7.21	80	3.13	1360
Female	1048	41.06	112	4.39	32	1.25	1192	46.71
Total	2144	84.01	296	11.60	112	4.39	2552	100.00

Table VII shows that of the 2552 respondents, 2114 (84.01%) are normotensive, 296 (11.60%) are prehypertensive, and 112(4.39%) are hypertensive. Comparing between male and female respondents, there are 1096 males and 1048 females who have normal blood pressure. Prehypertensive male is 184 (7.21%) while prehypertensive female is 112 (4.39%). Only 80 (3.13) from the male subjects and 32 (1.25%) from the female subjects are hypertensive. The prevalence of elevated blood pressure is higher in males than in females.

Several studies have shown that high blood pressure is an established risk factor for cardiovascular diseases. Furthermore, high blood pressure contributes substantially to cardiovascular incidence and premature mortality.

Table VIII
Blood Pressure of Respondents Stratified According to Age

Age	Normotensive		Prehypertensive		Hypertensive		TOTAL	
	F	%	F	%	F	%	F	%
13-19 y/o (adolescents)	132	5.17	102	4.00	16	0.63	250	9.80
20-40 y/o (early adults)	690	27.04	154	6.03	34	1.33	878	34.40
41-65 y/o (middle adults)	1312	51.41	40	1.57	59	2.31	1411	55.29
66 and older adults	10	0.39	0	0.0	3	0.12	13	0.51
Total	2144	84.01	296	11.60	112	4.39	2552	100.0

Table VIII shows that of the 2144 respondents in the 13-19 years age group, there were 132(5.17%) who are normotensive, 102 (4.0%) who are prehypertensive, and 16(0.63%) who are hypertensive.

For the 20-40 years category, there were 690 (27.04%) who are normotensive, 154 (6.03%) who are prehypertensive, and 34 (1.33%) who are hypertensive.

Under the 41-65 years category, 1312 (51.41%) are of normal blood pressure, 40 (1.57%) are prehypertensive, and 59(2.31%) are hypertensive.

For the respondents above 65 years of age, there were 10(0.39%) who are normotensive, 8 (0.31%) and 3 (0.12%) who are hypertensive. None among this age group is prehypertensive,

According to the NIH Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in adults, adults who have BMI of 25 or more are considered at risk for premature death and disability as a consequence of overweight and obesity. These health risks increases even more as the severity of an individual's obesity increases.

Meanwhile, under nutrition, too, has an impact on health. When a person's weight drops below a healthy range, risks for infections, diseases, complications with pregnancy, reduced physical strength and other conditions increase

4. Implications for action and future research

Food preferences among the respondents are generally balanced. The study showed that there is a low incidence of elevated BMI and blood pressure among the 2552 subjects. However, there is still a great need for health promotion integrating nutrition education focusing on three areas of knowledge namely adequate intake of nutrients, relationship between diet and disease, moderate kilocalorie intake coupled with regular exercise for physical fitness, obesity and hypertension prevention.

In addition, studies correlating food preferences with elevated BMI and hypertension must be conducted.

References

Books

Benjamin Caballero ;Luiz C. Trugo, Paul M. Finglas. Encyclopedia of food sciences and nutrition, 2nd ed. Amsterdam ; New York : Academic Press, c2003.

Grodner, Michele, Sara Long, Sandra de Young, Foundations and Applications of Nutrition: A Nursing Approach. Philadelphia: Mosby, Inc. 2004

Sumati R Mudambi, M V Rajagopal. Fundamentals of Foods, Nutrition and Diet Therapy . New Delhi: New Age International. 2005

Websites

Stacy, Carol, (1999), Body Mass Index [Online] Available: <http://www.faqs.org/nutrition/Ar-Bu/Body-Mass-Index.html#ixzz3FyNHdgRM>

http://en.wikipedia.org/wiki/Food_choice

<http://docs.schoolnutrition.org/newsroom/jcnm/07fall/caine-bish/index.asp>

Journal Articles

1. Herman, C. P.; Roth, D. A.; Polivy, J. (2003). "Effects of the presence of others on food intake: a normative interpretation". *Psychological Bulletin* 129 (6): 873. doi:10.1037/0033-2909.129.6.873
2. Hepper PG. Adaptive fetal learning: prenatal exposure to garlic affects postnatal preferences. *Animal Behavior*. 1988;36:935–936.
3. Mennella JA, Johnson A, Beauchamp GK. Garlic ingestion by pregnant women alters the odor of amniotic fluid. *Chemical Senses*. 1995;20:207–209. [PubMed]
4. Mennella, Jullie A. Development of food preferences: Lessons learned from longitudinal and experimental studies *Food Quality and Preference* Volume 17, Issues 7–8, October–December 2006, Pages 635
5. Mennella JA, Turnbull B, Ziegler PJ, Martinez H. Infant feeding practices and early flavor experiences in Mexican infants: an intra-cultural study. *Journal of the American Dietetic Association*. 2005;105:908–915. [PubMed]
6. Nestle, Marion; Wing, Rena; Birch, Leann; Disogra, Lorelei; Drewnowski, Adam; Middleton, Suzette; Sigman-Grant, Madeleine; Sobal, Jeffery et al. (2009). "Behavioral and

Social Influences on Food Choice". *Nutrition Reviews* 56 (5): 50. doi:10.1111/j.1753-4887.1998.tb01732.

7. Schaal B, Marlier L, Soussignan R. Human foetuses learn odours from their pregnant mother's diet. *Chemical Senses*. 2000;25:729–733. [PubMed]
8. Sullivan S, Birch LL. Infant dietary experience and acceptance of solid foods. *Pediatrics*. 1994;93:271–277. [PubMed]