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Knowledge, Perceptions, and Behaviors Related to Salt Use Among Philadelphia Chinese Take-Out Restaurant Owners and Chefs

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Abstract

Most of the sodium Americans consume comes from processed and restaurant foods. An upstream global strategy to promote health is to work with local restaurants to reduce sodium content in their food offerings, while accounting for food taste and economic considerations. In urban communities, Chinese take-out restaurants serve meals with large amounts of sodium and are clustered in low-income, racial/ethnic minority communities with a high prevalence of hypertension. The objective of this study is to assess baseline knowledge, attitudes, and behaviors related to sodium use/consumption among Chinese take-out owners and chefs recruited to participate in the Philadelphia Healthy Chinese Take-Out Initiative. A cross-sectional study of 221 Chinese take-out restaurants was conducted from August 2012 to February 2013. Items measured knowledge, attitudes, and behaviors related to salt use, salt consumption, and health. Most owners/chefs knew that excess sodium consumption contributes to high blood pressure but were less aware of other health effects and of major sources of sodium in the U.S. diet. The majority were willing and able to reduce sodium content in meals if customer demand could be maintained, and they desired training in food preparation, procurement, and marketing. Findings show a need to

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provide education, strategies, and support to Chinese take-out owners/chefs in preparing low-salt dishes. The results of this and future studies to reduce sodium content in meals by working with restaurant owners and chefs have global health promotion implications.

Keywords

sodium consumption; sodium reduction; Chinese restaurants; high blood pressure

INTRODUCTION

With the global growth of noncommunicable diseases and risk factors such as the significant increase in the consumption of sodium, the World Health Organization (2012) recently developed guidelines to significantly reduce sodium consumption. In the United States, most Americans consume more than 3,400 mg of sodium daily, exceeding the *Dietary Guidelines for Americans* recommendations of less than 2,300 mg for the general population (U.S. Department of Agriculture, 2010). Excessive sodium consumption is associated with a range of health consequences, including high blood pressure, stroke, heart failure, and kidney disease (Roger et al., 2012). More than 800,000 people die each year from heart disease, stroke, and other vascular diseases costing the United States more than $273 billion annually (Centers for Disease Control and Prevention [CDC], 2012a).

Meeting recommendations for sodium consumption is a challenge because more than 75% of sodium consumed by Americans comes from processed and restaurant foods, which is beyond consumers' control (Anderson et al., 2010; CDC, 2012b; Mattes & Donnelly, 1991). Furthermore, 33% of Americans eat at a fastfood restaurant at least weekly, 36% several times a month, with even higher rates among African Americans or Hispanics (40%; Monmouth University Polling Institute, 2012). Restaurant foods often have more sodium per calorie than processed foods purchased at the store (CDC, 2012b). Therefore, the Institute of Medicine (IOM; 2010) recommends population-wide strategies to reduce the amount of sodium in foods, focusing on the food industry in particular. Of the 980,000 U.S. restaurant locations (National Restaurant Association), 41,000 are Chinese restaurants (*Chinese Restaurant News*). The number of Chinese restaurants exceeds the number of McDonalds, Burger King, Wendy's, Dominos, and Pizza Huts combined (Lee, 2008). Chinese take-out food is inexpensive, convenient, and generally high in sodium (Jaworowska, Blackham, Stevenson, & Davies, 2012). Historically, salt was important in Chinese society as a commodity and to preserve food, while enhancing its taste (Hoi, 2011). An alteration in food preparation has the potential to affect a large population.

In Philadelphia and other U.S. urban areas, Chinese take-out restaurants are part of the fabric of low-income neighborhoods. These independently owned restaurants generally provide a small number of items, they have no sit-down service, and cashiers and chefs work behind bullet-proof glass. There are more than 400 independently operated Chinese take-out restaurants in Philadelphia, serving approximately 16,000 customers per day or 5.8 million customers per year (Greater Philadelphia Chinese Restaurant Association, personal communication, June 2013), with people frequenting the restaurants two to three times per

week. They are clustered in low-income neighborhoods with large African American and Hispanic populations. A sodium nutritional analysis conducted in July 2012 from 20 Chinese take-out restaurants in Philadelphia found an average of 3,200 mg of sodium in one of the most popular dishes, chicken lo mein (Ma, 2012). Philadelphia has the highest prevalence of hypertension among the 10 largest U.S. cities/counties (CDC, 2009), effecting 47% of African Americans and 31% of Hispanics (Public Health Management Corporation, 2012). A reduction in sodium use by Chinese take-out restaurants can have a significant impact on the health of at risk populations. In addition, nonchain independently owned restaurants may be an easier target as they have more flexibility with the menus and foods served (IOM, 2010).

The Philadelphia Department of Public Health partnered with Temple University's Center for Asian Health, the Greater Philadelphia Chinese Restaurant Association, and the Asian Community Health Coalition to conduct this study.

This descriptive study presents data from a baseline survey conducted with 221 Chinese take-out owners/chefs to proactively inform components of the intervention. The survey measured owners'/chefs' knowledge about salt consumption and its impact on health, perceptions on decreasing salt in Chinese take-out recipes, and current behaviors related to salt use in cooking. To our knowledge, this is the first initiative in the United States to work with Chinese take-out restaurants in order to reduce the amount of sodium served to consumers.

METHOD

Sample

We used a cross-sectional study design to assess the knowledge, attitudes, and behaviors related to salt use and consumption among Chinese take-out owners/chefs. Eligibility criteria included Chinese take-out restaurants located in high-poverty zip codes, in neighbor-hoods with large African American and Hispanic populations, that served solely as take-out establishments with Chinese owners or chefs. Eligible restaurants were drawn from local licensing data. A total of 437 restaurants were eligible to participate, and 300 were randomly selected from the total list of restaurants. We contacted all 300 take-out restaurants; 245 of them were reached, enrolled, and agreed to participate in the study. Among the enrolled restaurants, 221 completed the baseline survey with a response rate of 90.2%. Survey respondents were the restaurants' owners and/or chefs, those who knew the most about the restaurants' cooking practices.

Take-Out Owner/Chef Survey

A 68-item baseline survey was designed to assess the knowledge, attitudes, and behaviors related to salt use and consumption among Chinese take-out owners/chefs. Survey questions were adapted from tools developed by the Department of Health and Mental Hygiene, New York City, and the Health and Human Services Agency, Shasta County, California, as part of their sodium reduction work with independent restaurants.

Questions measured the following: knowledge about salt and chronic diseases associated with excess sodium consumption; current food preparation practices at the restaurant and at home; perceptions about preparing and offering low-sodium dishes, including perceived customer preferences; and demographic characteristics of customers. The survey was pilot tested with 10 owners/chefs and revised. The questionnaire was translated into Chinese for administration. In-person interviews were administered by the staff at the Center for Asian Health. Internal consistency was measured by Cronbach's alpha coefficient. Survey items (n = 12) that related to perceptions of customers willing to purchase low-sodium items and to chef interest in offering low-sodium options and willingness to use alternative spices and low-sodium foods showed high reliability (α = .83). Chef perceptions of self-efficacy in their ability to market low-sodium products to their customers was also high (α = .87). Chefs' perceptions of training needs for purchasing and marketing of low-sodium foods showed an acceptable level of reliability (α = .74).

Statistical Analyses

Statistical analyses were performed using SPSS 17.0 (Chicago, Illinois). A power analysis and sample size estimation using GPOWER (Faul, Erdfelder, Lang, & Buchner, 2007) was conducted. The study required a sample size of 89 chefs (α = .05, f = .15, power = .95), and 221 were obtained. Survey items with 4- or 5-point response scales were collapsed into two categories for analysis. *Strongly agree* and *agree* were combined to yes, and *strongly disagree*, *disagree*, and *neutral* were combined to no. Descriptive statistics were used to analyze the survey responses. Multivariable logistic regression was used to test the association between owner/chef interest in offering low-sodium meals and knowledge about the health effects of sodium, sodium sources in the diet, and perceived customer preferences about low-sodium options.

RESULTS

Restaurant, Owner/Chef, and Customer Information

A total of 221 Chinese take-out owner/chefs completed the survey. The majority of owners/chefs in the sample spoke Chinese as their first language. Approximately 65% reported being able to speak simple English with their customers, and 3% reported being able to speak Spanish with their customers. Ninety-one percent reported regularly serving African American customers, 44% served Hispanic customers, and 32% served Caucasian customers.

Knowledge About Health Effects of Sodium Consumption and Home/Family Characteristics

Owners/chefs (87%) agreed that consuming too much salt was harmful to one's health, and 70% knew that excess salt consumption was associated with high blood pressure (Table 1). A lower percentage knew that excess salt increased the risk of stroke (56%) and heart disease (53%). Thirty-nine percent incorrectly identified salt added at the table as the main source of sodium in the diet. More than a third (38%) identified salt from restaurant food as the main source of salt in our diet, whereas 15% identified processed foods.

Regarding personal or familial experience with hypertension and chronic health conditions, 9% reported themselves or a family member having high blood pressure and 22% with any chronic conditions. More than 50% indicated they did not use salt regularly or heavily in home cooking, and one third (32%) reported that they do not cook with salt at home the same way they do for their restaurant customers.

Current Nutritional and Preparation Practices

The vast majority of restaurant owners/chefs prepared their own sauces for restaurant cooking, such as Black sauce (95%) and Zuo Zong sauce (73%). The majority used fresh vegetables (94%), whereas less than half used canned vegetables (43%). Frying and sautéing were the most commonly used cooking methods (88%), and steaming (64%) and grilling (33%) were quite common.

Less than a quarter reported using nutrition labels for selecting food for their restaurants. Less than a third sought out low-sodium, low-fat, and low-cholesterol products while shopping (Table 1). Less than 20% offered or identified low-sodium items on their menus, yet more than 40% reported that customers asked about low-salt food options.

Perceptions, Self-Efficacy, and Training Needs to Reduce Sodium in Meals

More than half of owners/chefs believed that restaurants should reduce the sodium content of meals and that such reductions would benefit restaurants and attract customers (Table 2). Approximately 40% believed customers would choose low-sodium options from the menu.

Eighty percent of owners/chefs were interested in offering low-sodium meals. When asked about various ways to reduce sodium, 65% reported willingness to use fresh instead of canned vegetables. Forty-one percent were willing to use salt substitutes, and approximately one quarter were willing to use herbs and spices and low-sodium products, such as chicken broth or soy sauce.

Self-efficacy was relatively high, with approximately two thirds of owners/chefs expressing confidence in being able to reduce the sodium content of meals and more than half being confident in their ability to purchase low-sodium ingredients and market low-sodium items. At the same time, almost 80% reported a need for training in food preparation, procurement, and marketing, and 57% specifically desired instruction on low-sodium cooking techniques.

Multivariable logistic regression revealed that interest in offering low-sodium meals was more likely among owners/chefs who believed that it would not be too difficult to reduce sodium (odds ratio = 7.49; 95% confidence interval [0.223, 0.477]) and that low-sodium changes would not negatively affect customer purchases (odds ratio = 3.83; 95% confidence interval [0.036, 0.278]). Knowledge about the impact of excess sodium consumption on health, knowledge about high-sodium food sources, and knowledge about customer preferences about choosing and identifying low-salt options were not associated with owners'/chefs' interest in offering low-sodium options.

DISCUSSION

This baseline assessment of 221 Chinese take-out restaurant owners/chefs revealed that most understand the link between excess sodium consumption and high blood pressure but have less knowledge of other health effects, such as stroke and heart disease, and have limited personal experience with sodium-related illnesses. Most are willing and able to reduce the sodium content of their meals but desire training in food preparation, procurement, and marketing. Some are already engaged in sodium reduction strategies, such as shopping for low-sodium ingredients and offering and identifying low-sodium options on menus. Moreover, the potential for sodium reduction is high as most owners/chefs prepare their own sauces that serve as the base for many dishes, already use fresh vegetables more than canned, and make healthier meals at home for their families. Customer demand and maintaining revenue were the key concerns with regard to sodium reduction, yet more than 40% reported that customers currently ask for low-sodium options and would choose those options if offered.

To initiate population-level sodium reduction, it is imperative to actively involve the food industry as it may be difficult for individuals to make significant dietary changes on their own (I. J. Brown, Tzoulaki, Candeias, & Elliot, 2009). Although the IOM (2010) strongly recommends implementing mandatory standards for sodium in the food supply at the federal level, they advise the food industry to continue their voluntary approaches to reduce sodium until federal regulations are enacted. As this study demonstrates, Chinese take-out owners/chefs control procurement and preparation—particularly with base sauces such as Black sauce and Zuo Zong sauce that are commonly used in meals and consist of high-sodium ingredients—and reported relatively high self-efficacy in reducing sodium in meals. At the same time, many owners/chefs underestimated the role of restaurant foods as a source of dietary sodium and their contribution to chronic disease burden in communities.

Findings from the study highlight areas for training and technical assistance and existing strategies on which to build. Potential approaches to sodium reduction include using lower sodium alternatives (salt substitutes, soy sauce, chicken stock, noodles, fresh vegetables), using a smaller amount of salty ingredients/components of meals (base sauces), implementing cooking techniques to maintain flavor without salt (herbs, spices), and promoting low-sodium menu items. Nearly 80% of owners/chefs wanted training in purchasing low-sodium ingredients, and as few currently use nutrition labels while shopping, specific education on this practice may be beneficial. However, less than one quarter of owners/chefs were willing to use lower sodium products, possibly reflecting concerns about price and/or taste. Similarly, a small percentage were willing to use herbs and spices to reduce sodium content, but nearly 60% wanted cooking classes, suggesting that a lack of practical skills might be hindering use of this strategy. Although most chefs had never received formal culinary training, they did cite healthier home-cooking practices that could be leveraged for use in restaurants. Chinese food is popular globally possibly due to the fresh ingredients, the plentiful portions, and diversity of taste (Lee, 2008). Compared with traditional Chinese cooking methods, those used in Philadelphia take-out restaurants seemed to be less healthy, reflecting perceptions of customers' food tastes and preferences. African American children have been found to have higher sodium excretion than White children,

which may partially explain why in African American neighbor-hoods there is a preference for salty foods. This may lead restaurant owners, who already seem to know the negative health impact of excess intake of salt, to become hesitant to cut sodium content in their foods, especially for more established restaurants (L. K. Brown & Mussell, 1984).

Managing customer preferences represents key challenges to maintain both customer satisfaction and revenue, as identified by owners/chefs. Prior Philadelphia-based research highlights the complex, tense relations between Chinese take-out operators and their customers in low-income neighborhoods (Cannuscio, Weiss, & Asch, 2010). In this study, restaurant operators were asked about two separate but related approaches to sodium reduction—the first being reducing salt in meals without affecting customer' purchases, presumably by lowering salt gradually without affecting taste and without informing customers, and the second being reducing salt in select meals and identifying and marketing these meals to customers. Modifying foods without disturbing the flavor can be difficult as salt plays a significant role in taste, processing, and preservation of food (Dotsch et al., 2009). Consumers have adapted to the excessive amounts of sodium in foods, but research suggests that consumers' taste preferences can adjust to incremental changes in sodium content (Dotsch et al., 2009; IOM, 2010; Mattes, 1997). The goal would be to provide practical sodium reduction cooking techniques and recipe modifications that can gradually be incorporated into all menu items. Promotional activities could focus on restaurants' commitment to lowering sodium (e.g., "Less Salt, Healthier Eating"; see the appendix). If this approach were unsuccessful, promotion of select low-sodium items could be pursued, since the owners/chefs were willing to learn lower sodium cooking techniques.

With regard to procurement of low-sodium ingredients, distributors and manufactures will need to be engaged directly to ensure sufficient availability of such products at a competitive price. Because of the inherent difficulties faced by independent restaurants in low-income communities and the additional challenges raised by a sodium reduction initiative, collaboration with restaurant trade associations will be critical.

This study had several limitations. First, the respondents included only owners/chefs who had committed to participating, so they may not reflect Chinese take-out owners/chefs more generally. Second, a self-reported assessment of health knowledge and restaurant practices may be less accurate than actual knowledge testing and restaurant observations. Third, the responses may reflect a social desirability bias. Fourth, the survey did not allow for a nuanced assessment of why respondents were interested, willing, or able to engage in different sodium reduction strategies nor did it specifically ask about cost-related barriers.

CONCLUSION

To our knowledge, this is the first study to assess the knowledge, perceptions, and behaviors related to salt use among Chinese take-out restaurant owners/chefs in the United States. Since Chinese take-out restaurants are widespread in African American and Hispanic neighborhoods, a reduction in sodium use could have a significant impact on populations at high risk of hypertension. In addition, owners/chefs of independently owned Chinese take-out restaurants have some requisite knowledge of the health effects of sodium consumption

and generally are willing to lower the sodium content of their meals, particularly with further education. Anticipating and managing customer responses to sodium reduction will be needed to facilitate restaurant buy-in and initiative sustainability. Partnering with trade associations may enable community-wide scaling of restaurant-based sodium reduction initiatives. Even with these efforts, public education, distributor/manufacturer engagement, and implementation of nutrition standards by institutional purchasers will be needed to achieve population-wide reductions in sodium consumption (Cobb, Appel, & Anderson, 2012; IOM, 2010). Nevertheless, the implication of partnering with Chinese take-out restaurants in urban communities has potential benefits for the global health promotion goal of reduced sodium consumption and lowering the risk of hypertension and other noncommunicable diseases and conditions.

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APPENDIX

"Less Salt, Healthier Eating" Window Decal

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TABLE 1

Nutritional Knowledge and Practices Regarding Salt Intake

	% Agree or Strongly Agree (N = 221)
Knowledge	
Consuming too much salt in the diet is very harmful/harmful	87.3
High blood pressure is associated with consuming too much salt	69.7
Stroke is associated with consuming too much salt	56.6
Heart disease is associated with consuming too much salt	53.8
No chronic diseases are associated with consuming too much salt	3.6
The salt added at the table is the main source of salt in our diet	39.4
The salt in restaurant foods is the main source of salt in our diet	38.0
The salt in processed foods is the main source of salt in our diet	15.4
Family conditions and food preparation practices	
You or family members have high blood pressure	8.6
Family members with any chronic conditions	21.7
Always/usually add salt to meals when prepared for self	48.6
Add a lot/some salt to a typical meal that prepared for self	41.3
Food is prepared for self and family the same way as for customers	31.9
Restaurant food preparation practices	
Often use food labels when selecting foods for my restaurant	22.0
Frequently choose low-sodium foods/ingredients for restaurant	26.1
Frequently choose low-saturated fat foods/ingredients for restaurant	31.2
Frequently choose low-cholesterol foods/ingredients for restaurant	26.7
Use fresh vegetables in the preparation of their restaurant food	94.1
Use frozen vegetables in food preparation	4.5
Use canned vegetables in food preparation	42.5
Fry when cooking	87.8
Steam when cooking	64.3
Grill when cooking	33.3
Sauté when cooking	87.8
Currently offer low-salt food items	18.8

	% Agree or Strongly Agree (N = 221)
Menus currently identify low-salt options	17.5
Customers ask if low-salt options are available	42.7

TABLE 2

Perceptions, Self-Efficacy, and Training Needs to Lower Sodium Use in Restaurants

	% Agree or Strongly Agree (N = 221)
Perceptions	
There should be a reduction in the amount of salt in restaurant foods	57.7
Reducing the amount of salt in the menu options will benefit the restaurant	56.0
More customers will be attracted by offering low-salt options on the menu	55.5
Can reduce salt in food preparation without affecting customers' purchases	55.7
Customers would like low-salt options to be identified on the menu	45.2
Customers would choose items from the menu that are identified as low-salt options	45.0
Not interested in reducing the use of salt in food preparation	5.0
Interested in offering low-salt options to my customers now	77.9
Interested in offering low-salt options to my customers in the future	78.0
Willing to use salt substitutes to reduce salt in food preparation	41.2
Willing to use herbs, spices, and juices, to flavor foods to reduce salt	25.8
Willing to use lower salt products such as chicken broth or soy sauce	22.2
Willing to use fresh foods instead of canned foods	64.7
Self-efficacy	
Providing low-salt options at my restaurant is easy to do	67.0
Confident in ability to purchase low-salt food items from distributors	52.1
Confident in ability to market lower salt food options to customers	52.1
Training needs	
Need for training in purchasing low-salt food items from distributors	78.8
Need for training in marketing lower salt food options to customers	83.7
Cooking class is the most useful way to reduce salt in your food preparation	57.0
Monthly meeting is the best way to share ideas on how to reduce salt use in food	46.2