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Do Our Patients Have Enough to Eat? Food Insecurity among Urban Low-income Cancer Patients

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Abstract

This study assessed the prevalence and predictors of food insecurity among a cohort of underserved oncology patients at New York City cancer clinics. A demographic survey and the U.S. Household Food Security Survey Module were administered. A multivariate General Linear Model Analysis of Covariance was used to evaluate predictors of food insecurity. 404 completed the surveys. 18% had very low, 38% low, 17% marginal, and 27% high food security. The Analysis of Covariance was statistically significant ($F(7, 370) = 19.08$; $p < 0.0001$; R-Square = 0.26). Younger age, Spanish language, poor health care access, and having less money for food since beginning cancer treatment were significantly associated with greater food insecurity. This cohort of underserved cancer patients had rates of food insecurity nearly 5 times that of the state average. More research is needed to better understand the causes and impact of food insecurity among cancer and chronic disease patients.

In the U.S., 17.4 million households are food insecure.¹ In food insecure households there is reduced food intake by one or more household members and disrupted eating patterns because of a shortage of money or other resources for food.¹ Food insecure individuals have worse physical and mental health and are more likely to postpone medical care than food secure individuals, even after accounting for socioeconomic status.^{2–4}

Food insecurity is most prevalent in major cities, and disproportionately affects immigrant, non-citizen, ethnic minority, and low-income households.^{1, 5–7} A 2000 study of low-income Latino and Asian immigrants in urban areas in California, Texas, and Illinois found that 81% of households were food insecure and that Latino ethnicity and poor English were positive predictors of hunger.⁶ Latino immigrants surveyed at an urban medical center in Minneapolis had significantly higher rates of household food insecurity compared to U.S.-born non-Latinos.⁸ In a study of mothers across seven U.S. cities, households with

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immigrant mothers were at greater risk of food insecurity than those with U.S. born mothers, and food insecurity increased the risk of poor child health.⁹

Food insecurity is an especially compelling problem for the medically ill, who may be forced to choose between food and necessary medical treatment.^{4, 10} Inadequate nutrition is associated with immunosuppression, infection, and impaired postoperative wound healing, and interference with cognition and mental performance.^{11–15} Food insecure individuals and patients have significantly higher levels of nutritional risk, depression, financial strain, and low quality of life than food secure patients.^{16–20} Food insecurity is also associated with non-adherence to treatment protocols.^{10, 21, 22} Many studies report that food insecure patients are more likely to postpone medical care and often cannot afford prescribed medication(s).^{3, 4, 10} Food insecurity is also associated with poor dietary choices, including diets high in calories and saturated fat and low in fruits, vegetables, and whole grains.^{23–25}

Cancer patients represent an especially vulnerable group because of the intensity of treatment protocols and the disease process itself. The attendant decreased food intake directly impacts patient survival and quality of life.^{26–28} Nutrition interventions result in enhanced quality of life.^{29, 30} Despite the potential clinical ramifications of food insecurity among cancer patients, there is only one study addressing it, at a cancer center in Kentucky. It showed associated high levels of nutritional risk, depression, financial strain, and low quality of life.²⁰

This study examines food insecurity among low-income cancer patients at ten hospitals in New York City to assess the prevalence of the issue and to demonstrate the importance of its inclusion in the list of serious comorbidities among specific populations of cancer patients.

Methods

The Cancer Portal Project at the Center for Immigrant Health and Cancer Disparities (CIHCD) enrolls patients at ten hospital-based cancer clinics in New York City with large numbers of immigrant and low-income patients. “Portal” uses bilingual service access facilitators to assist patients in accessing and utilizing health, social, and financial services. The goal of Portal is to improve, by addressing social and economic barriers to care, underserved patients’ completion of cancer treatment regimens. The Portal Project employs three full-time and three part-time service access facilitators. Facilitators are trained in a range of areas, including: 1. assessing needs/advising patients on available assistance and resources, including cancer support organizations, social services, counseling, and cancer support groups; 2. assisting patients with financial support, including helping patients to obtain reimbursements and funding for doctors’ visits, chemotherapy, radiation therapy, scans, medical supplies, pain and nausea medications, and home care; 3. assisting with insurance and obtaining fee reductions; 4. providing assistance with intake procedures for patients with low literacy and limited English proficiency; 5. accessing interpreters; 6. helping to improve patient-provider communication; 7. assisting patients with transportation; 8. accessing child care for appointments; 9. accessing free or low-cost legal resources for immigration, health care proxies, wills, powers of attorney, permanency planning for

children, eviction, and work discrimination concerns; and 10. assisting with housing conditions and rent support.

Each facilitator is assigned to 1 or more cancer clinics, and visits his/her assigned clinic(s) at least once a week during either morning or afternoon clinic hours. Facilitators are also available at all times by cell phone and for additional in-person assistance as needed. During their clinic visits, service access facilitators approach all patients in the waiting or chemotherapy rooms of cancer clinics to enroll them in “Portal”.

This is a study of all patients enrolled in “Portal” between February and September 2010 who completed the USDA and CIHCD Food Security Surveys (described below). As part of the Portal intake, demographic, health care access, and cancer diagnosis and treatment information was collected and service needs were assessed. Patients were interviewed in their preferred languages. Information collected included gender, age, country of origin, years in the U.S., preferred language for health care, years of education, household size, health insurance status, whether patients had a primary care provider, and if patients were working with a social worker. Patients were also queried on cancer diagnosis, and type and length of treatment(s) currently being received. The 18-item, 12-month time-referenced U.S. Household Food Security Survey Module (USDA) was administered, along with the CIHCD food security and cancer treatment survey (CIHCD Food Security Survey), which includes questions on whether the patients have less money to spend on food since starting treatment, and, if so, the reasons why.³¹ The USDA survey includes questions on if/how often the respondent’s household’s food would run out before getting enough money to buy more, if/how often the household could not afford to eat balanced meals, if/how often any household members ever had to cut the size of their meals, skip meals, felt hungry, go a whole day without eating, or lost weight due to insufficient money for food.³¹

Descriptive analyses were performed to examine sociodemographic characteristics, health care access, cancer diagnoses and treatment, and food security variables. USDA survey results were used to calculate raw USDA food insecurity scores for each patient. Based on raw scores, and according to USDA scoring guidelines, patients were then categorized as having high food security, marginal food security, low food security, or very low food security (4=high food security, 3=marginal food security, 2=low food security, 1=very low food security).³¹ A multivariate General Linear Model Analysis of Covariance was used to analyze the food security outcome. A multivariate logistic regression model was used to evaluate the binary variable of having less money to spend on food since starting treatment. Missing, ‘Don’t know’, and ‘Refused’ values were excluded from these tests, and all tests were two-sided, with the conventional P value < 0.05 considered statistically significant.

This study was granted exemption status by the New York University Institutional Review Board (the authors’ affiliation at the time the study was conducted).

Results

Approximately 70% of all patients approached (n=781) in the cancer clinic waiting areas agreed to participate in Portal. Five-hundred and forty-seven cancer patients were enrolled in

Portal; 404 completed the USDA and CIHCD Food Security Surveys, and were included in the study. Reasons for lack of completion included: refusal with no reason given (25%), patients feeling too sick to complete the surveys (36%), and patients not having enough time to complete the surveys (39%).

Sixty-two percent of the 404 patients who completed the USDA and CIHCD Food Security Surveys were female, the mean age was 57, and 73% were born outside of the U.S. Of the immigrant patients, 28% had resided in the U.S. for less than 10 years. Thirty-four percent preferred to speak Spanish and 14% preferred to speak Chinese in the healthcare setting. Twenty-four percent were uninsured. Of the insured, 59% had Medicaid (excluding Medicaid for emergency services) and 20% had Medicaid for emergency services only. Patients had a variety of cancer diagnoses, with breast being the most common (37%). At the time of intake, 46% were receiving chemotherapy, 24% were receiving radiation therapy, 78% had been in treatment for 6 months or fewer, and 45% were receiving treatment 5–7 days a week. (Table 1)

Eighteen percent of the 404 patients assessed by the USDA Food Security Survey Module were found to have very low food security, 38% had low food security, 17% marginal, and 27% had high food security. There were no missing data for the USDA Food Security Survey Module (the module was fully completed by all 404 patients). Seventy-six percent of participants reported having less money to spend on food since starting treatment (data were missing for this question for 14 patients). Reported reasons for this included the cost of transportation to appointments (84%), job loss/decrease in work hours due to frequent appointments (81%), more expensive diet needed while undergoing cancer treatment (59%), appointment fees (39%), and cost of cancer medication(s) (26%).

A multivariate General Linear Model Analysis of Covariance was undertaken, guided by a bivariate analysis of sociodemographic and clinical predictors of results of the four-level USDA Food Security Survey Module (Table 2 describes the correlations used to develop the model). After removing the non-significant predictors in the multivariate analysis, the overall model was statistically significant ($F(8, 380) = 10.61; p < 0.0001; R\text{-Square} = 0.18$). Table 3a summarizes the parameter estimates and mean differences for categorical variables.

As can be seen in Table 3a, women reported significantly lower food security scores compared to men. Younger patients reported significantly greater food insecurity than older patients. Preferred language was a significant ($F(3, 380) = 11.46; p < 0.0001$) predictor of food insecurity. Patients whose preferred language was Spanish reported significantly greater food insecurity than speakers of Mandarin but did not differ from English speakers. English speakers reported significantly greater food insecurity than Mandarin speakers. Significantly lower food security scores were reported by patients with Medicaid for emergency services compared to patients with other types of insurance, and to those with no insurance. Not having a primary care provider (PCP) was a significant predictor of food insecurity. Finally, patients diagnosed with gastrointestinal cancers reported less food security than those diagnosed with non-gastrointestinal cancers (breast, gynecological, lung, prostate, blood, or other cancers). However, this relationship was only marginally significant.

The strongest predictor of food insecurity was the CIHCD item asking the patient if she/he had less money to spend on food since beginning cancer treatment ($r = -0.41$; $p < 0.0001$). Introduction of this variable into the Table 3a model described above led to a number of changes. Once again, the overall model was statistically significant ($F(7, 370) = 19.08$; $p < 0.0001$; $R\text{-Square} = 0.26$). Table 3b summarizes the parameter estimates and mean differences for categorical variables. Age continued to be a significant predictor. As patient age decreased there was a significant increase in food insecurity. Preferred language continued to be a significant predictor ($F(3, 370) = 5.87$; $p = 0.0006$). Spanish speakers reported significantly greater food insecurity than speakers of Mandarin. English speakers reported slightly greater food insecurity compared to Mandarin speakers but this difference was not statistically significant. Spanish speakers reported greater food insecurity compared to English speakers but this difference was not statistically significant. The receipt of Medicaid for emergency services, and not having a PCP, continued to be significant predictors of lower food security.

While it was not surprising to find that having less money to spend on food was strongly related to increased food insecurity, we wished to determine those variables that are predictive of positive responses to this question (of whether patients had less money to spend on food since starting cancer treatment). Guided by the point biserial correlations between the explanatory variables (see Table 2) and the binary response to the “less money” question, a multivariate logistic regression model was developed. After the elimination of non-significant predictors, the overall model was statistically significant ($LR(8) = 85.50$; $p < 0.0001$; $\text{Max-rescaled } R\text{ Square} = 0.30$). Table 4 summarizes the parameter estimates for this model.

As can be seen in Table 4, patients who prefer to speak Spanish were 2.68 times more likely to report they have less money to spend on food compared to other patients. By contrast, Mandarin speaking patients were 85% *less* likely to report having less money for food since their treatment started, as were those born in the United States (66% *less* likely). Patients without health insurance of any kind were significantly more likely to report not having enough money for food. For those who were insured, patients with Medicare were 55% less likely to report having had less money for food since starting treatment. The point biserial correlations also suggested that various cancer sites were associated with reports of having insufficient funds for food since starting cancer treatment. In Table 4, it can be seen that patients having gynecological cancer were 3.28 times more likely to report insufficient funds, while patients with gastrointestinal cancers were 2.07 times more likely to do so. However, patients with prostate cancer were 63% less likely to say they had insufficient funds.

Conclusion

In this study of low-income, predominantly immigrant and minority cancer patients, 56% were found to be food insecure (very low or low food security), more than 3 times higher than the national average (14.5%) and nearly 5 times higher than the state average (12.4%).^{1, 32} Given the importance of nutrition in cancer patients' treatment, survival, and

quality of life, these findings highlight the need to recognize and address food insecurity among underserved cancer patients.²⁹

Spanish language preference, younger age, poor health care access (i.e. not having a PCP, having Medicaid for emergency services), and reporting having less money for food since beginning cancer treatment were significantly associated with greater food insecurity. Patients with these characteristics may be at greater risk, and may be in greater need of timely and intensive intervention. Of interest, patients with gastrointestinal cancers may also be at greater risk for food insecurity than those with other cancer diagnoses, including prostate. This issue warrants further exploration, but could be related to the increasing number of prostate cancer patients being diagnosed with low risk tumors hence requiring less aggressive, less time consuming and/or less expensive treatment; or related to differences in patients' cancer stage at enrollment (detailed data on stage was not collected in this study).³³

This study has limitations. The prevalence of food insecurity may have been over or underestimated. Because patients included in this study presumably enrolled in "Portal" because of a need for support and assistance, it is possible that the rates of food insecurity are overestimated. It is also possible that rates are underestimated: patients at risk for food insecurity, such as undocumented immigrants, may have been fearful of accessing health care and services.^{34, 35} In addition, our sample included a larger proportion of patients born in Latin America compared to other immigrant sending countries. Further studies with larger numbers of patients from different regions of origin are needed. Despite these limitations, the current study provides an important look at food insecurity in a vulnerable population.

More research is needed to better understand the causes and impact of food insecurity among cancer and other patients with severe and chronic illnesses. Because of the financial burden associated with the treatment of cancer and chronic diseases such as diabetes, heart disease, asthma, and hypertension, the possibility that a diagnosis of cancer or another chronic condition directly contributes to food insecurity should be further explored.³⁶⁻⁴⁰ Future studies should examine the relationship between employment status and return to work after a cancer diagnosis, and its impact on food security. Studies should also include measurements of nutritional risk, such as body mass index, to gain a better understanding of the association between food insecurity and nutritional deficiency among patients with cancer or other chronic diseases. Long-term cohort studies should be conducted to assess the impact of food insecurity on survival. Currently, the authors are investigating the impact of food insecurity on cancer treatment completion.

A multi-disciplinary approach including researchers, clinicians, community-based organizations, and policymakers is needed to develop and implement interventions to address food insecurity among vulnerable patients with cancer and other chronic diseases. Interventions should also target health care professionals to improve knowledge on food insecurity and its impact on patients with chronic disease, and on how to screen for food insecurity, and to increase awareness of resources to address food insecurity. The target audience should include primary care and specialty physicians, nurses, social workers, and others working with cancer and chronic disease patients. Food security screening should be

considered as a component of the standard of care for all cancer and chronic disease patients.

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Table 1Sociodemographic Characteristics, Cancer Diagnosis and Treatment, n(%)^{*}

	n=404
Gender	
Male	154(38)
Female	250(62)
Age	
20–39	32(8)
40–49	88(22)
50–59	119(30)
60–69	108(27)
70–99	55(14)
Missing	2
Country of Birth	
Latin America [‡]	119(30)
Caribbean [‡]	92(23)
United States (including Puerto Rico)	108(27)
Asia [§]	60(15)
Other Countries ^{//}	24(6)
Missing	1
Years in the U.S.	
Less than 1 year	13(3)
1–5 years	66(17)
6–9 years	34(9)
10–15 years	49(12)
16–20 years	47(12)
>20 years	83(21)
N/A (born in the U.S.)	108(27)
Missing	4
Preferred Language	
English	201(50)
Spanish	138(34)
Chinese (Mandarin/Cantonese)	55(14)
Other	10(2)
Education	
Kindergarten – 5th Grade	47(12)
6th – 8th Grade	86(21)
Some High School (9th–11th Grade)	55(14)
12th Grade/HS Graduate	154(38)
Some college	31(8)
College graduate (16 or more years)	29(7)

	n=404
Missing	2
Household Size	
1	79(21)
2	137(36)
3	89(23)
4 or more	77(20)
Missing	22
Health Insurance Status	
Insured	304(76)
Uninsured	97(24)
Missing	3
Type of Health Insurance	
Uninsured	97(25)
Medicaid	173(44)
Emergency Medicaid	59(15)
Medicare	41(10)
Private	21(5)
Missing	13
Do you currently have a PCP?	
Yes	240(60)
No	157(40)
Missing	7
Social Worker	
Yes	95(24)
No	301(76)
Missing	8
Diagnosis	
Breast	147(37)
Gastrointestinal	73(18)
Gynecological	36(9)
Lung	34(8)
Prostate	42(10)
Blood	29(7)
Other	40(10)
Missing	3
Type of Treatment	
Chemotherapy	179(46)
Radiation therapy	91(24)
Combination of Therapies	75(19)
Surgery	26(7)
Hormonal	15(4)
Missing	18

	n=404
Length of Time in Treatment	
Less Than A Month	92(24)
1–3 Months	147(39)
4–6 Months	58(15)
7–12 Months	34(9)
More than One Year	48(13)
Missing	25
Frequency of Treatment	
1–3×'s Monthly	99(29)
1–2×'s Weekly	69(20)
3×'s Weekly	20(6)
5×'s Weekly/Daily	156(45)
Missing	60

* Percentages calculated excluding Missing values.

[†] Latin America includes Belize, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, and Venezuela.

[‡] The Caribbean includes the Bahamas, Barbados, Grenada, Guyana, Haiti, Jamaica, St. Lucia, St. Thomas, St. Vincent, Trinidad, and the Virgin Islands.

[§] Asia includes China, Thailand, and the Philippines.

// Other countries include Albania, Bangladesh, Egypt, England, Germany, Ghana, Kenya, Malaysia, the Netherlands, Nigeria, Poland, Russia, and Yemen.

Table 2

Correlations of Explanatory Variables With Food Security Status and Less Money for Food

	Food Security Status	Less Money for Food
Explanatory Variables		
Less Money for Food	-0.41 ****	
Has Primary Care Provider	0.26 ****	-0.14 ***
Age	0.22 ****	-0.18 ***
Emergency Medicaid Recipient	-0.20 ****	0.05
Prefers to Speak Chinese	0.19 ***	-0.24 ****
Prefers to Speak Spanish	-0.18 ***	0.25 ****
Patient has Prostate Cancer	0.15 ***	-0.17 ***
Born in the United States	0.15 ***	-0.17 ***
Medicare Recipient	0.13 ***	-0.16 ***
Gender	-0.09 *	0.06
Patient has Health Insurance	0.09 *	-0.17 ***
Patient has Gynecological Cancer	-0.08	0.11 **
Patient has Gastrointestinal Cancer	-0.05	0.09 *

p < 0.0001***
p < 0.01**
p < 0.05*
p < 0.10

Table 3

a-Model 1 for the USDA Food Security Survey Module									
Variable	Parameter Estimate	Standard Error	t-value	Probability	Food Security Categorical Variable Means	95% Confidence Limits			
Intercept	0.89	0.41	2.17	0.0306		0.08, 1.69			
Gender:									
Women	-0.22	0.11	-2.03	0.0430	2.04	-0.44, -0.007			
Men					2.27	1.80, 2.29			
Age	0.01	0.004	2.60	0.0097		0.003, 0.02			
Preferred Language:									
English	1.05	0.32	3.27	0.0012	2.34	2.15, 2.54			
Spanish	0.81	0.32	2.48	0.0136	2.10	1.90, 2.30			
Mandarin	1.58	0.34	4.63	< 0.0001	2.88	2.59, 3.17			
Emergency Medicaid Recipient:									
Yes	-0.38	0.15	-2.50	0.0128	1.96	-0.68, -0.08			
No					2.34	1.65, 2.28			
Has Primary Care Provider:									
Yes	0.41	0.12	3.52	0.0005	2.36	0.18, 0.64			
No					1.95	2.11, 2.61			
Gastrointestinal Cancer:									
Yes	-0.26	0.13	-1.91	0.0574	2.03	-0.52, 0.008			
No					2.28	1.73, 2.32			
						2.07, 2.50			

b- Revised Model 1 for the USDA Food Security Survey Module									
Variable	Parameter Estimate	Standard Error	t-value	Probability	Food Security Categorical Variable Means	95% Confidence Limits			
Intercept	1.57	0.40	3.90	0.0001		0.78, 2.36			
Age	0.01	0.004	2.20	0.0283		0.001, 0.02			
Preferred Language:									
English	0.95	0.30	3.11	0.0020	2.57	2.39, 2.76			
Spanish	0.83	0.31	2.68	0.0077	2.45	2.25, 2.66			
Mandarin	1.28	0.33	3.90	0.0001	2.90	2.63, 3.18			
Emergency Medicaid Recipient:									
Yes	-0.46	0.15	-3.11	0.0020	2.16	-0.74, -0.17			
No					2.62	1.86, 2.46			
Has Primary Care Provider:									
Yes	0.33	0.11	2.94	0.0035	2.55	0.11, 0.55			
No					2.23	2.32, 2.78			
Patient Has Less Money for Food Since Starting Cancer Treatment:									
Yes	-0.79	0.12	-6.54	< 0.0001	1.99	-1.03, -0.55			
No					2.79	1.79, 2.20			
						2.52, 3.05			

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b – Revised Model 1 for the USDA Food Security Survey Module						
Variable	Parameter Estimate	Standard Error	t-value	Probability	Food Security Categorical Variable Means	95% Confidence Limits
No						

Table 4

Final Model for “Less Money for Food since Starting Cancer Treatment?”

Variable	Parameter Estimate	Standard Error	Wald Chi-Square	Probability	Odds Ratio Point Estimate	95% Wald Confidence Limits
Intercept	0.99	0.54	3.38	0.07		
Patient Prefers to Speak Spanish	0.49	0.18	7.20	0.0073	2.68	1.30; 5.52
Patient Prefers to Speak Mandarin	-0.96	0.20	23.58	< 0.0001	0.15	0.07; 0.32
Patient Born in the United States	-0.54	0.16	11.86	0.0006	0.34	0.18; 0.63
Medicare (Yes/No)	-0.40	0.20	3.97	0.0463	0.45	0.21; 0.99
Health Insurance (Yes/No)	-0.44	0.20	4.93	0.0264	0.41	0.19; 0.90
Cancer Site: Prostate vs. All Other Cancers	-0.49	0.20	5.96	0.0146	0.37	0.17; 0.82
Cancer Site: Gynecological vs. All Other Cancers	0.59	0.33	3.20	0.0738	3.28	0.89; 12.10
Cancer Site: Gastro-Intestinal vs. All Other Cancers	0.36	0.20	3.49	0.0618	2.07	0.96; 4.45