

## Food Insecurity among Cancer Patients: A Systematic Review

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### Abstract

**Background:** An increasing number of studies have examined food insecurity among cancer patients. Many adverse effects associated with cancer and its treatment are also associated with food insecurity, including fatigue, depression, restricted activity, malnutrition, and weakened resistance to infection.

**Methods:** We conducted a systematic review of published articles on food insecurity among cancer patients. Bibliographic searches were conducted in PubMed and CINAHL with relevant search terms. A total of 128 article citations were identified in PubMed and non-duplicates in CINAHL. After screening the abstracts or full texts of these articles and reviewing the references of previous review articles, we were left with 11 studies that met the eligibility criteria.

**Results:** A sizeable percentage of cancer patients have food insecurity, although estimates have ranged widely. Factors associated with a higher prevalence of food insecurity include younger age, non-Hispanic Black or Hispanic race/ethnicity, Spanish language, lower income, lower education, having no insurance coverage, single relationship status, having children at home, poor health care access, having poor health or diet, and having less money for food since beginning cancer treatment.

**Conclusion:** Food insecurity is an important consideration for clinical oncology practice, especially when caring for patients with lower socioeconomic status and racial/ethnic minorities. Screening cancer patients and cancer survivors for food insecurity and referring food insecure patients to community resources is likely to be beneficial. Additional studies are needed with a longitudinal design to examine the effectiveness of interventions aimed at addressing food insecurity among cancer patients.

**Keywords:** Cancer; Food Insecurity; Social Needs

### Introduction

Food insecurity is an important social determinant of health<sup>[1]</sup>. The U.S. Department of Agriculture defines food insecurity as “a household-level economic and social condition of limited or uncertain access to adequate food”<sup>[2]</sup>. Low-income, ethnic minority and female-headed households are at greatest risk for food insecurity<sup>[5]</sup>. People who experience food insecurity often consume a nutrient-poor diet, which may contribute to cancer risk factors such as obesity and diabetes<sup>[1,3,4]</sup>. In order to buy food or because of budget constraints, low-income families may postpone medical care and underuse medicine<sup>[1]</sup>. Food insecurity is associated with stress, anxiety, depression and psychological distress<sup>[5]</sup>.

An increasing number of studies have examined food insecurity among cancer patients and among cancer survivors who have completed primary therapy for the disease<sup>[6-15]</sup>. Many adverse effects associated with cancer and its treatment are also associated with food insecurity, including fatigue, depression, restricted activity, malnutrition, and weakened resistance to infection<sup>[10]</sup>. Food insecure patients may not comply with prescribed therapies because they may be choosing between paying for

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food or paying for medical care<sup>[10,16]</sup>.

Given the potential negative consequences of food insecurity for cancer patients and the burgeoning literature on this topic, we conducted a systematic review of published articles on food insecurity among cancer patients. Of particular interest were the prevalence and correlates of food insecurity in different groups of cancer patients and cancer survivors as well as associations between food insecurity and outcomes such as health-related quality of life.

## Methods

The present review is based upon bibliographic searches in PubMed and CINAHL and relevant search terms. Articles published in English from 1980 through June 24, 2021 were identified using the following MeSH search terms and Boolean algebra commands: food insecurity AND cancer. The searches were not limited to words appearing in the title of an article or to studies in a particular country or geographic region of the world. The references of published articles were also reviewed. Information obtained from bibliographic searches (title and topic of article, information in abstract, study design, and key words) was used to determine whether or not to retain each identified article. Only studies written in English that examined the frequency of food insecurity among cancer patients were eligible for inclusion.

## Results

A total of 128 article citations were identified in PubMed and non-duplicates in CINAHL (Figure 1). After screening the abstracts or full texts of these articles and reviewing the references of previous review articles, we were left with 11 studies that met the eligibility criteria. Ten of the studies were cross-sectional surveys and one study had a longitudinal design (Table 1). Ten of the studies were from the United States and one was from Cairo, Egypt.

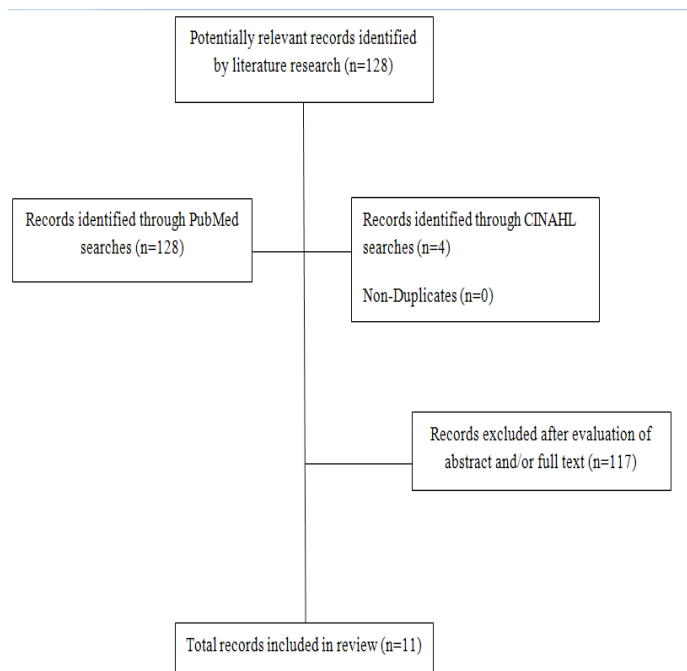


Figure 1: Flowchart of record selection process

Simmons et al.<sup>[10]</sup> conducted a cross-sectional survey of 115 cancer patients in Kentucky (Table 1). The survey was conducted in chemotherapy, hematology/oncology, and gynecology/ oncology clinic waiting rooms. The prevalence of food insecurity and food insecurity with hunger were 17.4% and 7.8%, respectively. Food insecure patients had higher rates of depression, financial strain, and nutritional risk, and lower quality of life than food secure patients. Food insecure patients also reported more instances of medication noncompliance, including not taking medications or taking less than directed by their oncologists because they could not afford the medications.

Gany et al.<sup>[11]</sup> conducted a cross-sectional survey of 404 underserved oncology patients at 10 New York City cancer clinics. Nearly one-fifth (18%) had very low, 38% low, and 17% marginal food security. 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. In a separate study that may have included patients from the earlier survey, Gany et al.<sup>[7]</sup> surveyed 1,390 underserved ethnic minority patients receiving cancer care in 10 cancer clinics and hospitals in New York City. Of the 1,390 patients, 41.1% had low food security and 17.1% had very low food security. Health-related quality of life decreased with each lower food security level.

Bilodeau et al.<sup>[8]</sup> conducted baseline and follow-up surveys of a parent of 52 pediatric cancer patients in Boston. The surveys were conducted after 6 months of chemotherapy and at least 1 year following cancer therapy. Eight percent of the families had food insecurity within 30 days of diagnosis. The frequency of food insecurity after 6 months of chemotherapy and at least 1 year off therapy were 23% and 17%, respectively.

Charkhchi et al.<sup>[6]</sup> examined food insecurity among persons with a history of cancer (n=10,232) who completed the social context module of the 2015 Behavioral Risk Factor Surveillance System survey. The prevalence of food insecurity was 22.7% (95% CI 21.3-24.0) among persons with a history of cancer.

Trego et al.<sup>[12]</sup> examined food insecurity among 1,022 cancer survivors from the 2011-2014 National Health and Nutrition Examination Surveys. About 8.4% were food insecure. Several factors were significantly associated with food insecurity including female gender, younger age, non-Hispanic Black or Hispanic race/ethnicity, lower income, no insurance coverage, lower education, single relationship status, having children at home, having poor health or diet, and cancer characteristics (i.e., non-melanoma skin cancer, female reproductive cancer).

Hastert et al.<sup>[9]</sup> examined food insecurity among 1754 participants in the Detroit Research on Cancer Survivors cohort, a population-based study of African American survivors of breast, colorectal, lung, and prostate cancer. The frequency of food insecurity was 14.8%.

McDougall et al.<sup>[13]</sup> examined food insecurity among 394 individuals age 21-64 years old with stage I-III breast, colorectal, or prostate cancer identified from the New Mexico Tumor Registry. Among the 394 cancer survivors, 229 (58%) were food secure in both the year before and the year after cancer diagnosis (persistently food secure), 38 (10%) were food secure in the year before and food insecure in the year after diagnosis (newly food insecure), and 101 (26%) were food insecure

**Table 1:** Studies of food insecurity among cancer patients

Author	Design	Sample	Results
Simmons et al., 2006	Cross-sectional survey conducting in chemotherapy, hematology/oncology, and gynecology/ oncology clinic waiting rooms	115 cancer patients in Kentucky	The prevalence of food insecurity and food insecurity with hunger were 17.4% and 7.8%, respectively. Food insecure patients had higher rates of depression, financial strain, and nutritional risk, and lower quality of life than food secure patients. Food insecure patients also reported more instances of medication noncompliance, including not taking medications or taking less than directed by their oncologists because they could not afford the medications.
Gany et al., 2014	Cross-sectional survey	Underserved oncology patients at 10 New York City cancer clinics (n=404)	Nearly one-fifth (18%) had very low, 38% low, and 17% marginal food security. 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.
Gany et al., 2015	Cross-sectional survey	Underserved ethnic minority patients (n=1,390) receiving cancer care in 10 cancer clinics and hospitals in New York City	Of the 1,390 patients, 41.1% had low food security and 17.1% had very low food security. Health-related quality of life decreased with each lower food security level.
Bilodeau et al., 2017	Baseline and follow-up surveys (of a parent) conducted after 6 months of chemotherapy and at least 1 year following cancer therapy	Fifty-two pediatric cancer patients in Boston	Eight percent of the families had food insecurity within 30 days of diagnosis. The frequency of food insecurity after 6 months of chemotherapy and at least 1 year off therapy were 23% and 17%, respectively.
Charkhchi et al., 2018	Cross-sectional survey	Persons with a history of cancer (n=10,232) who completed the social context module of the 2015 Behavioral Risk Factor Surveillance System survey	The prevalence of food insecurity was 22.7% (95% CI 21.3-24.0) among persons with a history of cancer.
Trego et al., 2019	Cross-sectional surveys	Cancer survivors (n=1,022) from the 2011-2014 National Health and Nutrition Examination Surveys	About 8.4% were food insecure. Several factors were significantly associated with food insecurity including female gender, younger age, non-Hispanic Black or Hispanic race/ethnicity, lower income, no insurance coverage, lower education, single relationship status, having children at home, having poor health or diet, and cancer characteristics (i.e., non-melanoma skin cancer, female reproductive cancer).
Hastert et al., 2020	Cross-sectional survey	1754 participants in the Detroit Research on Cancer Survivors cohort, a population-based study of African American survivors of breast, colorectal, lung, and prostate cancer	The frequency of food insecurity was 14.8%.
McDougall et al., 2020	Cross-sectional survey	394 individuals age 21-64 years old with stage I-III breast, colorectal, or prostate cancer identified from the New Mexico Tumor Registry	Among the 394 cancer survivors, 229 (58%) were food secure in both the year before and the year after cancer diagnosis (persistently food secure), 38 (10%) were food secure in the year before and food insecure in the year after diagnosis (newly food insecure), and 101 (26%) were food insecure at both times (persistently food insecure). Newly food insecure and persistently food insecure cancer survivors were considerably more likely to forgo, delay, or make changes to prescription medication than persistently food secure survivors.
Zheng et al., 2020	Cross-sectional surveys	The 2013-2017 National Health Interview Surveys were used to identify 12,141 cancer survivors and 143,664 individuals without a cancer history	Compared with individuals without a cancer history, cancer survivors aged 18-39 years reported higher “often true” levels regarding worry about food running out (7.9% vs. 4.6%, P=0.004), food not lasting (7.6% vs. 3.3%, P=0.003), and being unable to afford balanced meals (6.3% vs. 3.4%, P=0.007). Findings were not as consistent for cancer survivors aged 40-64 years. Lower income and higher comorbidities were generally associated with greater food insecurity in all age groups.

Berger et al., 2020	Cross-sectional surveys	The 2014-2018 National Health Interview Surveys were used to identify adults with a history of throat/pharynx head and neck cancer.	About 17.7% of head and neck cancer patients reported their food security status as marginally secure or not secure.
Gany et al. 2020	Cross-sectional survey	100 women with breast cancer in Cairo, Egypt	Nearly one-half of participants (47.5%) were food insecure. Most (60.7%) often or sometimes could not afford to eat balanced meals, 42.6% reported that their food often or sometimes ran out and they could not afford to purchase more, and 27.9% had experienced being hungry and not eating because of the cost.

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Zheng et al.<sup>[14]</sup> examined food insecurity among 12,141 cancer survivors and 143,664 individuals without a cancer history who participated in the 2013-2017 National Health Interview Surveys. Compared with individuals without a cancer history, cancer survivors aged 18-39 years reported higher “often true” levels regarding worry about food running out (7.9% vs. 4.6%, P=0.004), food not lasting (7.6% vs. 3.3%, P=0.003), and being unable to afford balanced meals (6.3% vs. 3.4%, P=0.007). Findings were not as consistent for cancer survivors aged 40-64 years. Lower income and higher comorbidities were generally associated with greater food insecurity in all age groups.

Berger et al.<sup>[15]</sup> examined food insecurity among adults with a history of throat/pharynx head and neck cancer who participated in the 2014-2018 National Health Interview Surveys. About 17.7% of head and neck cancer patients reported their food security status as marginally secure or not secure.

Gany et al.<sup>[17]</sup> examined food insecurity among 100 women with breast cancer in Cairo, Egypt. Nearly one-half of participants (47.5%) were food insecure. Most (60.7%) often or sometimes could not afford to eat balanced meals, 42.6% reported that their food often or sometimes ran out and they could not afford to purchase more, and 27.9% had experienced being hungry and not eating because of the cost.

## Discussion

The results of this review indicate that a sizeable percentage of cancer patients have food insecurity, although estimates have ranged widely. In national surveys, estimates of the prevalence of food insecurity among persons with a history of cancer range from 8.4% to 22.7%<sup>[6,12]</sup>. In a survey of underserved oncology patients at 10 New York City cancer clinics, Gany et al.<sup>[11]</sup> found that 56% had very low or low food insecurity, indicating that the prevalence of food insecurity varies with characteristics of the patient population. Factors associated with a higher prevalence of food insecurity include younger age, non-Hispanic Black or Hispanic race/ethnicity, Spanish language, lower income, lower education, having no insurance coverage, single relationship status, having children at home, poor health care access, having poor health or diet, and having less money for food since beginning cancer treatment<sup>[11,12]</sup>. In the study by Zheng et al.<sup>[14]</sup>, cancer patients with comorbidities were more likely to be food insecure. Cancer patients in low or middle income countries may also be more likely to be food insecure<sup>[17]</sup>.

In the one longitudinal study of food insecurity among cancer patients<sup>[8]</sup>, food insecurity increased during cancer treatment which may be due to changes in income and employment, together with increased financial strain. McDougall et al.<sup>[13]</sup> argued that “the relationship between food insecurity and chronic illness is bidirectional or cyclic, with chronically ill individuals facing financial challenges leading to food insecurity and food-insecure individuals being forced to make trade-off between food and medical care, leading to poor health outcomes and exacerbating financial hardship.”

Food insecure cancer patients have been found to have higher rates of depression, financial strain, and nutritional risk, and lower quality of life than food secure patients<sup>[7,10]</sup>. Food insecure patients are also less likely to comply with prescribed medications because they can’t afford them<sup>[10,13]</sup>. For example, in the study by McDougall et al.<sup>[13]</sup>, newly food insecure and persistently food insecure cancer survivors in New Mexico were considerably more likely to forgo, delay, or make changes to prescription medication than persistently food secure survivors. In the study by Simmons et al.<sup>[10]</sup>, food insecure patients reported more instances of medication noncompliance, including not taking medications or taking less than directed by their oncologists because they could not afford the medications. These findings are consistent with results from studies of other patient populations (not selected because they had a history of cancer) which indicate that food insecure patients often cannot afford prescribed medications and are more likely to postpone medical care<sup>[18-20]</sup>. Food insecurity may also have negative effects on cancer through weakened resistance to infection and malnutrition<sup>[10]</sup>.

Gany et al.<sup>[11]</sup> noted that “There is a critical need to raise awareness among the medical community and policy makers about the pronounced and detrimental prevalence of food insecurity among our most underserved, impoverished, and disenfranchised patients.” A multi-disciplinary approach is needed to develop and implement interventions to address food insecurity among vulnerable patients with cancer, including researchers, clinicians, community-based organizations, and policymakers<sup>[11]</sup>. Resources available to food insecure patients include local food banks, home-delivered meals, and the Supplemental Nutrition Assistance Program<sup>[21,22]</sup>. Interventions aimed at health care professionals can seek to improve knowledge of food insecurity and its impact on cancer patients, increase awareness of resources to address food insecurity, and train providers on how to screen for food insecurity<sup>[11]</sup>.

In conclusion, food insecurity is an important consideration for clinical oncology practice, especially when caring for patients with lower socioeconomic status and racial/ethnic

minorities<sup>[10]</sup>. Screening cancer patients and cancer survivors for food insecurity and referring food insecure patients to community resources is likely to be beneficial and may improve treatment adherence and reduce socioeconomic disparities in cancer outcomes<sup>[13]</sup>. Additional studies are needed with a longitudinal design to examine the effectiveness of interventions aimed at addressing food insecurity among cancer patients and to further assess the relationship between food insecurity and patient outcomes and wellbeing.

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