

Assess Role of Public Health Nursing Nutrition Label in Assessment and Interventions of Women

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ABSTRACT

Background: Obesity and chronic diseases are strongly linked to dietary habits, with women, individuals in rural areas, and those from lower socioeconomic backgrounds being particularly vulnerable. Public Health Nurses (PHNs) providing home-visit services are uniquely positioned to address nutritional concerns among at-risk populations. However, limited research exists on the role of PHN interventions in improving nutrition knowledge, behaviors, and outcomes.

Methods: This study utilized de-identified data from adult female clients receiving PHN home visits. Nutrition-related data were documented using the Omaha System, which categorizes client problems, interventions, and outcomes across domains. Nutrition Knowledge, Behavior, and Status (KBS) were rated on a Likert scale from 1 (least favorable) to 5 (most favorable). Data from 558 clients were analyzed to assess their nutrition profiles, interventions received, and outcomes. Statistical tests compared client characteristics and intervention types across different home-visit categories.

Results: The sample comprised 558 women, with an average age of 26.1 years. Participants received an average of 6.5 visits over 189 days. Nutrition KBS scores indicated basic knowledge (3.4), inconsistent to usually appropriate behavior (3.7), and minimal signs or symptoms (4.3). Nutrition interventions ranged from 0 to 36 per client, averaging 7.3 interventions. Women receiving high-risk family visits had lower Nutrition KBS scores but received the most nutrition interventions, addressing dietary management, feeding procedures, and behavior modification. First-time parent visits prioritized breastfeeding-related interventions, while non-pregnancy-related visits received the fewest interventions overall.

Conclusion: While PHN home-visiting programs effectively address various health concerns, nutrition is not consistently assessed or prioritized. This study emphasizes the need for enhanced strategies to improve nutrition KBS among home-visited women. Expanding intervention diversity, including multicomponent strategies and case management, could further optimize outcomes and reduce health disparities. Future research should explore targeted, evidence-based nutrition interventions in PHN practices.

Keywords: nurse, women, nutrition.

INTRODUCTION

Dietary habits play a significant role in contributing to obesity and are closely linked to chronic diseases (Department of Health and Human Services, National Institute of Diabetes and Digestive and Kidney Diseases, 2012). As a result, improving nutrition has become a priority in public health initiatives (HealthyPeople2020, 2017). Although many individuals could benefit from improving aspects of their diet, various social factors create barriers to achieving proper nutrition, contributing to health disparities among certain populations (HealthyPeople2020, 2017). For instance, obesity prevalence is notably higher among women (Ogden, Carroll,

Fryar, & Flegal, 2015), individuals in rural areas (Trivedi et al., 2015), those from diverse racial and ethnic backgrounds (Ogden et al., 2015), and those with lower incomes (Ogden, Lamb, Carroll, & Flegal, 2010). Therefore, innovative strategies are necessary to encourage healthy dietary practices, especially for those at higher risk of or already experiencing overweight and obesity.

A promising approach involves leveraging public health nurses (PHNs) who provide home-visit services to improve clients' nutritional outcomes. PHNs are instrumental in promoting overall health and wellness (American Nurses Association, 2013b) by adopting personalized, client-focused care that fosters partnerships between nurses and clients (Monsen, Radosevich, Kerr, & Fulkerson, 2011). Their role extends to addressing various determinants of health, including environmental, psychosocial, physiological, and behavioral factors. PHN home-visited clients often include pregnant women, parenting families, individuals with social or medical risk factors, and aging adults at risk of or already experiencing disability or frailty. These nurses cater to diverse nutritional needs, tailoring their care based on client circumstances, such as acute and chronic illnesses, pregnancy, postpartum or breastfeeding, and growth in infants and children (Ackley & Ladwig, 2014).

Extensive research supports the effectiveness of home-visiting programs for at-risk populations, particularly pregnant and parenting clients. These programs have been linked to numerous positive outcomes, such as enhanced parenting practices, improved home environments, better health care utilization, and strengthened social-emotional development in children (Sweet & Appelbaum, 2004; Avellar & Supplee, 2013). For aging adults and those with disabilities, evidence is somewhat mixed but generally supports benefits like reduced mortality, improved functional status, decreased nursing home admissions, and enhanced quality of life (Markle-Reid et al., 2006; Abbott & Elliott, 2017). Additional outcomes for these populations include reduced pain, anxiety, depression, and improved medication adherence.

Despite evidence demonstrating the positive impact of PHN home-visiting programs, little is known about their role in assessing and addressing nutrition-related concerns. Limited studies have explored the relationship between PHN interventions and client nutrition knowledge, behaviors, and outcomes. Research on this topic primarily focuses on maternal-child populations, highlighting gaps in identifying and addressing nutrition problems during home visits. For example, one study found that 75% of clients met dietary guideline recommendations (Fetrick, Christensen, & Mitchell, 2003). However, other studies reported that nutrition problems were less frequently identified compared to other health concerns (Monsen et al., 2010), or were identified in only 30% of high-risk clients, with no detection in lower-risk clients (Monsen et al., 2011). While some interventions were applied, their specific details and effectiveness were not fully described.

These findings suggest that nutrition, while a key aspect of PHN responsibilities, may not be consistently assessed or prioritized during home visits. PHNs are well-positioned to address these issues, as their scope of practice includes evidence-based interventions such as case management, counseling, and advocacy for policy changes (American Nurses Association, 2013a). These strategies align with best practices for promoting nutrition and physical activity behavior change (County Health Rankings, 2017).

Behavior change is inherently challenging, but PHN interventions account for a notable proportion of client outcomes (Monsen, Chatterjee, Timm, Poulsen, & McNaughton, 2015). Home-visiting PHNs often engage with clients during transitional periods, such as pregnancy or after a new diagnosis, when individuals may be more receptive to interventions aimed at improving nutrition and related behaviors (Wilkinson & McIntyre, 2012). Using frameworks like the Stages of Change Theory (Prochaska & Velicer, 1997), PHNs can facilitate progress through precontemplation, contemplation, planning, and action stages by offering support, setting goals, and addressing barriers. This research aims to provide insight into how PHNs contribute to improving nutrition outcomes and addressing health disparities through home-visiting programs.

METHOD

Design

This study utilized existing data from women receiving public health nursing (PHN) home visits. The study drew on de-identified data from routine PHN documentation, exempting it from review by the institutional ethics board. Data were documented using the Omaha System, a standardized taxonomy for classifying and recording client issues, interventions, and outcomes. The Omaha System Problem Classification Scheme enables PHNs to identify and document up to 42 client problems, including actual problems, potential problems, or areas for health promotion, across four domains: Environmental, Psychosocial, Physiological, and Health-related Behaviors. Nutrition, as a problem area, falls within the Health-related Behaviors domain.

The Problem Rating Scale for Outcomes within the Omaha System was used to rate Knowledge, Behavior, and Status (KBS) for each identified problem on a Likert scale from 1 to 5. A score of 1 represents the least favorable outcomes (e.g., no knowledge or extreme signs and symptoms), while a score of 5 represents the most favorable outcomes (e.g., superior knowledge or absence of signs and symptoms). PHNs were trained to ensure consistent documentation and rating of client problems.

The Omaha System Intervention Scheme served as both a care planning tool and a means to document interventions. Interventions were categorized by terms such as Teaching, Guidance, and Counseling, with

additional specificity provided by defined targets (e.g., dietary intake, feeding procedures) and customizable descriptions tailored to client needs.

Data were collected from adult female clients who received at least one PHN home visit with documented KBS scores for one or more of the 42 problems over the study period. After excluding cases with conflicting or duplicate entries, the final sample consisted of 558 clients.

Measures

1 Client Characteristics

Client characteristics included age, race, identified problems, KBS ratings, duration of care (in days), and the number of home visits received. Three calculated variables were analyzed:

- **Total Problems:** Sum of the number of identified problems documented on the first visit.
- **Behavior Profile:** Total number of problems with Behavior scores of 3 or lower on the first visit.
- **Status Profile:** Total number of problems with Status scores of 3 or lower on the first visit.

For instance, a client with four identified problems (e.g., income, pregnancy, physical activity, and substance use), where Status scores for three were at or below 3, would have a Status Profile score of 3.

2 Nutrition Measures

Nutrition measures included Nutrition KBS scores and the total number of signs and symptoms related to nutrition documented in the records.

3 Visit Types

Visits were grouped into three categories:

1. **High-risk, family home visits:** These involved long-term follow-ups and might include additional breastfeeding support.
2. **First-time parent home visits:** Typically one-time visits for lower-risk parents, sometimes with additional telephonic breastfeeding support.
3. **Other home visits:** These addressed non-parenting-related concerns, such as disease prevention, control of latent conditions, or nursing home avoidance programs.

4 Nutrition Interventions

Nutrition-related interventions included those targeting nutrition problems, dietary intake, feeding procedures, or related care descriptions (e.g., food insecurity, breastfeeding). The total number of nutrition interventions and the total number of unique types of interventions were recorded. For example, if a client received the same intervention multiple times, both the total number and the count of unique interventions were documented.

Analytic Strategy

Descriptive and inferential statistics were employed for analysis. Frequencies and percentages described categorical variables, while means, standard deviations, and ranges were used for continuous variables. Skewed variables (e.g., total and unique nutrition interventions) were categorized to reduce skewness.

General linear models compared least square mean estimates of client characteristics (e.g., age, number of visits, Nutrition KBS scores) across visit types. Chi-square tests assessed whether specific nutrition interventions were more likely used depending on visit type, provided those interventions were utilized by more than 5% of the sample. Statistical significance was set at a p-value of 0.05.

RESULTS

Sample Characteristics

Among the 558 participants, 93% (519) had a specified visit type, and 84% (469) had at least one Nutrition KBS rating recorded. The average age of women receiving PHN home visits was 26.1 years ($SD = 7.0$), with 10% identifying as racially or ethnically diverse. On average, participants had 6.5 home visits ($SD = 12.2$, median = 1), received services for 189 days ($SD = 263.7$, median = 26.5, mode = 1), and were provided with 7.3 interventions ($SD = 7.5$, median = 5). The majority of women (47%) received first-time parent home visits, 37% received high-risk family home visits, and 15% received home visits for reasons unrelated to pregnancy or parenting.

During the initial visit, women had an average of 6.5 ($SD = 3.3$, median = 6) total problems documented with KBS ratings. The Behavior Profile averaged 1.7 ($SD = 2.5$), and the Status Profile averaged 1.1 ($SD = 1.5$), indicating that, on average, women had 1–2 problems where behavior or status was moderately to severely impaired.

On average, participants' Nutrition Knowledge scores were 3.4 ($SD = 0.7$), indicating basic knowledge, Nutrition Behavior scores were 3.7 ($SD = 0.8$), reflecting inconsistent to usually appropriate behavior, and Nutrition Status scores were 4.3 ($SD = 1.0$), signifying minimal signs or symptoms (Table 1).

The number of nutrition interventions delivered ranged from 0 to 36, with an average of 7.3 interventions per client (SD = 7.5, median = 5). Table 3 outlines the nutrition-related interventions provided, categorized by Problem, Category, Target, and Care Description. Most interventions addressed the Nutrition problem and targeted areas such as dietary management, laboratory findings, physical signs/symptoms, and behavior modification.

Interventions targeting dietary management were often linked to Caretaking/Parenting and Postpartum problems, while those addressing feeding procedures were associated with Caretaking/Parenting, Pregnancy, and Postpartum concerns. Additional nutrition-related interventions involved Income-finances, Pregnancy-support systems, and Postpartum-wellness. Most interventions were categorized under Teaching, Guidance, and Counseling, with fewer classified as Surveillance, and none as Case Management (Table 3).

Client characteristics varied significantly based on the type of home-visiting services received (Table 2). Differences were observed across demographics, the number of visits, problems identified during the first visit, and client Behavior and Status Profiles.

Specific to nutrition, women receiving home visits unrelated to pregnancy or parenting exhibited the lowest Nutrition KBS scores, the highest number of Nutrition signs and symptoms, and the fewest nutrition interventions. In contrast, clients receiving high-risk family home visits had lower Nutrition KBS ratings compared to first-time parent home visit clients but received the greatest number of nutrition interventions (Table 2).

High-risk family clients were more likely to receive nearly all types of nutrition interventions across various problems compared to other groups. The only exception was breastfeeding-related interventions under Caretaking/Parenting and Postpartum, which were more frequently provided to first-time parent clients (88%) than to high-risk family clients. Women receiving visits for non-pregnancy-related reasons were the least likely to receive a diverse range of nutrition interventions.

Table 1. Demographic and variables of interest for home-visited women (N = 558)

Client characteristics	Mean	SD	Freq	%	Range
Age	26.1	7.0			11–49
Race					
Caucasian			502	90	
Diverse			56	10	
Number of visits ^a	6.5	12.2			0–88
Length of time in programming (days)	189	263.7			1–1,155
Program/Visit type ^b					
High-Risk Family home visit			194	37	
First-time Parent Family home visit			245	47	
Other than for pregnancy or parenting ^c			80	15	
Total Problems with KBS ratings charted on first visit	6.5	3.3			1–13
Behavior Profile ^d	1.7	2.5			0–12
Status Profile	1.1	1.5			0–9
Nutrition Knowledge ^e	3.4	0.7			1–5
Nutrition Behavior ^f	3.7	0.8			1–5
Nutrition Status ^f	4.3	1.0			1–5
Number of Nutrition Signs and Symptoms	0.3	0.7			0–4
No nutrition signs and symptoms			442	79	
At least one sign and symptom			116	21	
Number of nutrition interventions completed	7.3	7.5			0–36
0			98	18	
1 ≤ 2			67	12	
>2 ≤ 4			76	14	
>4 ≤ 6			86	15	
>6 ≤ 9			91	16	
>9 ≤ 15			63	11	
16 or more			77	15	
Number of nutrition intervention types used	6.4	6.2			0–28
0 types of interventions			98	18	
>0 ≤ 3 types interventions			106	19	
>3 ≤ 5 types of interventions			112	20	
>5 ≤ 9 types of interventions			123	22	
> 9 types of interventions			119	21	

^a The total number of visits variable was only reported for 436 clients.

^b Program/visit type was only reported for 519 clients.

^c Reasons for home visiting other than for pregnancy or parenting home visit programming included: disease prevention and control; latent tuberculosis; new refugee; waiver program; PCA authorization/reauthorization; and Minnesota Choice Visits, designed to help prevent nursing home admission.

^d Behavior Profile scores sum the number of problems documented with Behavior ratings ≤ 3 on first visit.

^e Status Profile scores sum the number of problems documented with Status ratings ≤ 3 on first visit.

^f Nutrition Knowledge, Behavior, and Status ratings were reported for 469 clients.

Table 2. Demographic and variables of interest for home-visited women by home visit type (n = 519)

Client characteristics	Least square mean estimates by visit type			Frequency (%) by visit type			P
	PHN HR	PHN LR	OTH	PHN HR	PHN LR	OTH	
Age	22.0	27.3	32.3				<.001
Race							
Caucasian							
Diverse							
Number of visits ^a	14.2	1.2	3.8				<.001
Total problems with KBS ratings charted on first visit	9.1	5.8	3.5				<.001
Behavior Profile ^b	3.3	0.4	1.8				<.001
Status Profile ^c	1.9	0.2	1.5				.01
Nutrition Knowledge ^d	3.0	3.7	3.3				<.01
Nutrition Behavior ^d	3.5	4.1	3.1				<.001
Nutrition Status ^d	4.2	4.6	3.1				<.001
Total nutrition signs and symptoms	0.4	0.1	0.8				<.001
Number of nutrition interventions completed	13.4	5.7	0.6				<.001
0				6 (4%)	3 (2%)	61 (76%)	
1 ≤ 2				20 (10%)	30 (12%)	12 (15%)	
>2 ≤ 4				11 (6%)	58 (24%)	3 (4%)	
>4 ≤ 6				25 (13%)	58 (24%)	2 (3%)	
>6 ≤ 9				17 (9%)	71 (29%)	2 (3%)	
>9 ≤ 15				38 (20%)	25 (10%)	0 (0%)	
16 or more				78 (40%)	0 (0%)	0 (0%)	
Number of nutrition intervention types used	11.3	5.2	0.6				<.001
0 types of interventions				6 (3%)	3 (1%)	61 (76%)	
>0 ≤ 3 types interventions				26 (13%)	56 (23%)	15 (19%)	
>3 ≤ 5 types of interventions				25 (13%)	85 (35%)	2 (3%)	
>5 ≤ 9 types of interventions				29 (15%)	90 (37%)	2 (3%)	
>9 types of interventions				108 (56%)	7 (5%)	0 (0%)	

PHN HR = public health nurse high-risk family home-visited clients (n = 194). PHN LR = public health nurse low-risk first-time parent home-visited clients (n = 245). PHN other = public health nurse visited clients for

reasons other than pregnancy or parenting ($n = 80$), which included: disease prevention and control; latent tuberculosis; new refugee; waiver program; PCA authorization/reauthorization; and Minnesota choice visits, designed to help prevent nursing home admission.

^a The total number of visits was only reported for 436 clients.

^b Behavior Profile scores sum the number of problems documented with Behavior ratings ≤ 3 on first visit.

^c Status Profile scores sum the number of problems documented with Status ratings ≤ 3 on first visit.

^d Nutrition Knowledge, Behavior, and Status ratings were reported for 469 clients.

DISCUSSION

This descriptive study analyzed existing data to explore public health nurse (PHN) nutrition interventions and client nutrition outcomes among women receiving home visits in a rural Midwestern County. Findings revealed that all clients had opportunities for improvement in their nutrition, as indicated by initial Nutrition Knowledge, Behavior, and Status (KBS) scores. While women demonstrated basic nutrition knowledge, the type and number of nutrition interventions provided varied depending on the reason for the home visit. Four key patterns emerged, highlighting areas for future interventions and research.

The average scores for Nutrition Knowledge (3.4) and Nutrition Behavior (3.7) indicated inconsistently appropriate behaviors and a need for improvement. Previous studies have reported that only 30% of high-risk clients and no low-risk clients had nutrition problems (Monsen et al., 2011). However, this study identified that high-risk clients and those visited for non-pregnancy/parenting reasons had only basic nutrition knowledge and behavior. The universal assessment of nutrition KBS implemented by the agency revealed the potential to enhance nutrition-related care. Future research could evaluate the effectiveness of incorporating nutrition assessments into care plans, electronic health records, and agency policies to encourage PHNs to address nutrition concerns consistently.

PHNs utilized a variety of nutrition interventions, aligning with earlier research (Monsen et al., 2011). This study, by analyzing care description data, identified distinct interventions categorized under Nutrition, Income, Caretaking/Parenting, Pregnancy, and Postpartum problems. These findings indicate that PHNs customize their interventions based on clients' specific problems and needs. Future research should investigate how these interventions impact clients' nutrition and weight outcomes. Notably, Case Management interventions (e.g., referrals to WIC or supplemental nutrition programs) were either underutilized or undocumented. As multicomponent interventions are recommended for effective behavior change (County Health Rankings, 2017), agencies should include Case Management interventions in care plans and documentation systems to ensure comprehensive nutrition care.

Women receiving visits unrelated to pregnancy or parenting had the lowest nutrition behavior and status ratings and the most signs and symptoms of nutrition problems. Despite this, they were the least likely to receive nutrition interventions. The agency's universal assessment policy allowed identification of these at-risk clients, presenting opportunities for targeted interventions. Future studies should explore why these high-risk clients receive fewer documented nutrition interventions and identify strategies to improve intervention delivery.

Differences in breastfeeding-related interventions were observed between high-risk family clients and first-time parent clients. Breastfeeding interventions were routinely documented under Pregnancy, Postpartum, and Caretaking/Parenting problems. However, high-risk family clients, who often receive prenatal visits, were more likely to receive breastfeeding interventions during pregnancy but fewer in the postpartum period. This variation could stem from factors such as timing of enrollment in high-risk programs, competing postpartum priorities (e.g., housing instability), or documentation differences across programs. Further research focusing on breastfeeding interventions could help clarify these patterns and improve support for clients' breastfeeding goals.

CONCLUSION

Given the relationship between dietary habits and obesity, understanding PHN efforts in nutrition assessment and intervention is crucial. While home-visiting programs have demonstrated numerous health benefits, minimal research has focused on PHN nutrition interventions. This study highlights the need for improved nutrition KBS among home-visited women and identifies opportunities to enhance intervention strategies. Incorporating more multicomponent interventions, particularly Case Management, and revising care plans to address unmet needs can enhance PHN services. PHNs play a critical role in addressing nutrition and weight-related health disparities through targeted assessments and interventions. Future research should evaluate the impact of these efforts on client nutrition and broader health outcomes.

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