

## Research Article

# Influence of Psychosocial Factors on Optimal Dietary Intake of Immuno-Suppressed Women of Kakamega County

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Received: October 21, 2015; Accepted: November 23, 2015; Published: November 25, 2015

## Abstract

The study focused on assessing the predictive power of psychosocial factors influencing optimal dietary intake of immune-suppressed women. This cross-sectional study was conducted from August to November, 2014 in Kakamega County within 3 Comprehensive Care Clinics that were purposively sampled. Proportionate stratified sampling was utilized to obtain 220 respondents. A structured questionnaire was used to collect quantitative data where exploratory factor analysis tested dimensionality of questions, while skewness and kurtosis assessed normality of data. Structural equation modeling determined predictive power of latent variables. The model fitted data acceptably well,  $\chi^2 = 156$ ,  $P < 0.001$ , Tucker Lewis index = 0.93, comparative fit index = 0.95, root mean square error of approximation = 0.090, Hoelter critical N (0.01) = 220, with regard to dietary behavior. Regression weights showed predictive power for women's attitude ( $\beta = 0.42$ ,  $P < 0.01$ ), subjective norm ( $\beta = 0.36$ ,  $P < 0.05$ ), perceived behavioral control ( $\beta = 0.48$ ,  $P < 0.05$ ), and intention ( $\beta = 0.95$ ,  $P < 0.001$ ). This study provides data on a good approach for promoting optimal dietary intake that will improve the food frequency and nutrient intake of immune-suppressed women.

Keywords: Immuno-Suppressed; HIV/AIDS; Dietary Intake

## Introduction

The global distribution of HIV/AIDS and its prevalence varies widely, with more men being infected and dying from the pandemic than women except in sub-Saharan Africa where women are dying more than men [1]. The prevalence of HIV/AIDS among women in Kenya is very high (40 percent) compared to men (33 percent) [2]. Several factors including socioeconomic, political, legal and cultural practices as well as biological factors make women more vulnerable to HIV infection than men [3]. Yet they are also the main caretakers for everyone who becomes ill with AIDS. In Kenya, HIV epidemic is superimposed on a pre-existing and longstanding background of extensive malnutrition. Weight loss is the AIDS-defining diagnosis for about 20 percent of people with AIDS [4] and ultimately occurs among a majority of people living with AIDS. Loss of the muscle tissue is one of the most debilitating and relentless complications of HIV/AIDS [5]. There is a critical level of body cell mass below which survival is impossible. It is indicated that death occurs for those with wasting syndrome either when their body weight approaches 66 percent of their ideal body mass or when body cell mass approaches 54 percent of normal [4]. Whereas the prevalence of HIV/AIDS is high (45 percent) in Kakamega County, a household ability to produce and buy food is reduced, and as a coping strategy dietary intake is reduced. This coping strategy is commonly practiced by women since they are the care takers of homes. Women living with HIV/AIDS are the worst affected since their immune status is lowered as a consequence of sub-optimal dietary intake behavior. The woman's intention to initiate sub-optimal dietary intake is triggered by her attitude, subjective norm and perceived behavioral control (Somerset

et al., 2004). Optimal dietary intake intention is a significant predictor of optimal dietary intake influencing food frequency and nutrient intake. Studies have described many factors associated with dietary intake of immune suppressed people [6]. These factors include education level, economic status, nutrition knowledge, attitude towards food, and social support network. Understanding factors associated with optimal dietary intake enables health professionals to plan and evaluate appropriate interventions to improve food frequency and nutrient intake of immune-suppressed women. Since sub-optimal dietary intake increases the risk of HIV infection and the progression of the disease which exacerbates malnutrition [7]. Malnutrition is initiated from reduced dietary intake, nutrient malabsorption and increased utilization as well as increased excretion of proteins and micronutrients in response to the invading pathogens (HIV) [8]. The aim of this study was to assess the predictive power of psychosocial factors that include attitude, subjective norm, perceived behavioral control and intention on optimal dietary intake of immune-suppressed women and develop a strategy for improving their food frequency thus nutrient intake.

## Study Framework

This study adapted Ajzen's TPB model (Figure 1) to fit psychosocial factors that influence optimal dietary intake of immune suppressed women. The TPB model works on the basis that the approach to target behavior intention, which in turn is seen to be operation of 4 exogenous variables: attitude, subjective norm, perceived behavioral control and intention. In this context attitude was the certainty about the likely outcomes of optimal dietary intake multiplied by evaluation of these outcomes (behavioral beliefs). Subjective norm was the

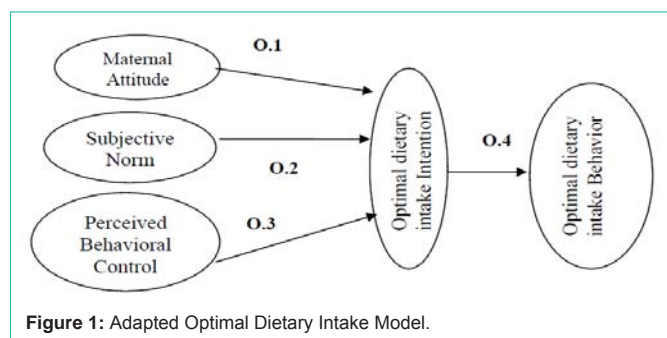


Figure 1: Adapted Optimal Dietary Intake Model.

belief of the respondent over important people in her life that may or may not have influenced her optimal dietary intake (normative beliefs). Perceived behavioral control was viewed as control factors to promote or inhibit the respondent's optimal dietary intake multiplied by the power she had over those factors (control beliefs). Perceived behavioral control was measured both directly and indirectly since dietary intake is not under completely volitional control. Therefore, attitude and subjective norm were posited to have influenced optimal dietary intake indirectly through dietary intention. While perceived behavioral control both directly and indirectly manipulated optimal dietary intake, the immediate antecedent of intention, which was described as a behavioral tendency that captured the motivational factors that had an impact on optimal dietary intake as a behavior. The latent variables can also be endogenous since they depend on observed variables to be measured, whereas observed variables can be exogenous since they are independent variables. When a variable is believed to "cause" another variable, the relationship between variables is shown as directed arrow, from cause to effect. Whether one variable "causes" another is an assumption that the researcher makes and only data can reveal. Co variation between 2 variables is shown as a 2 headed arrow connecting the variables. As a framework of competency, psychosocial factors influencing optimal dietary intake describes improving food frequency and nutrient intake are determined primarily by a respondent's cognitive judgment and expectation concerning her ability to practice optimal dietary intake. To comprehend optimal dietary intake using the TPB model, an elicitation study was initially conducted prior to the current study to elicit salient beliefs on which exogenous variable are based. This was then employed to construct a questionnaire, which was pretested and used to assess the influence of these psychosocial factors on optimal dietary intake (Figure 1). Four specific objectives were intended to be achieved. Based on the above literature the objectives generated for the study are shown in (Figure 1).

1. Determine the influence of respondent's attitude on optimal dietary intake
2. Determine the influence of respondent's subjective norm/social pressure on optimal dietary intake
3. Determine the influence of respondent's perceived behavioral control on optimal dietary intake
4. Determine the influence of respondent's intention on optimal dietary intake

## Methods

This study was conducted in Kakamega County which is one

out of the forty seven Counties of Kenya where almost a half of the population are living below the poverty line meaning they cannot afford the basic necessities. It is agrarian where 60 percent of the population lives in the rural areas with women accounting for 49 percent of agricultural produce (County Statistic Office Kakamega, 2009). This County was selected out the others due prevalence of sub-optimal dietary intakes amongst immune-suppressed women of reproductive age. The study employed a cross-sectional design that involved a sequential mixed plan conducted from August to November, 2014. Sequential mixed plan involves the collection and analysis of both qualitative and quantitative data in a single study in which the data is collected sequentially, based on priority and sequence of information [9]. The study was limited to immune-suppressed women of reproductive age who were receiving nutritional support at selected three Comprehensive Care Centres in Kakamega County who were recruited through informal contact. Stratified sampling was utilized to select the study sample. A sampling frame, which was Immune-suppressed women, was divided into stratus of County hospital, Mission hospital and private hospital. Proportionate stratified sampling was then applied to get the sample size of respondents from each stratum depending on the size of the stratum. Random sampling was then conducted on each stratum depending on the sample size to get the final sample size. The sample was obtained by distributing the respondents proportionately among the four clinics using the following formula.

$Y=220 X/N$  Where:

Y=Number of respondents required in the clinic in question.

X=Total number of respondents in the clinic in question.

N=Total population of respondents in the three clinics.

Based on the above formula 102 respondent were sampled from a County Hospital, 68 from a Mission Hospital and 50 from a private Hospital. A total of 220 respondents formed the sample size. The study criteria excluded women who received Comprehensive Care services from more than Comprehensive Care Clinic. Those who had missed 2 consecutive appointments at the Comprehensive Care Clinic were also not eligible since they had neglected the Comprehensive Care Clinic regulations as well as missed essential nutrition package of information. Participation in study was voluntary although 4 percent (9) of the respondents dropped out of the study due unavoidable circumstances but were immediately replaced through a random sampling procedure performed on eligible participants. The respondents were not compensated for taking part in the study but were highly appreciated and given a debriefing letter after completion of interview sessions.

## Data Collection Instrument

Data was collected by 3 trained research assistants using interview schedules from the three Comprehensive Care Centers clinics during August to November, 2014. A seven point Likert scale dietary behavior questionnaire was used to measure all the variables characteristics. The Likert scale was constructed in a continuum ranging from extremely unlikely/strongly disagree/should not mostly=1; least unlikely/disagree/should not more=2; unlikely/should not/least disagree=3; undecided=4; likely/should/slightly agree=5; more likely/should more/agree=6; extremely likely/should most/strongly

**Table 1:** Reliability test for optimal dietary intake questionnaire.

Concepts Measurement	Number of Items	Cronbach's alpha (pretest, n=22)	Cronbach's alpha (main survey, n=220)
<b>Dietary Intake measures</b>			
Food Frequency	3	0.44	0.62
Nutrient diversity	3	0.57	0.66
<b>Salient Belief Measures</b>			
Attitude towards Food Frequency	6	0.51	0.68
Attitude towards Nutrient diversity	6	0.54	0.65
<b>Normative Belief Measures</b>			
Social influences towards Food Frequency	6	0.55	0.60
Social influences towards Nutrient diversity	6	0.56	0.66
<b>Control Belief Measures</b>			
Perceived Behavioral Control towards Food Frequency	6	0.47	0.66
Perceived Behavioral Control towards Nutrient diversity	6	0.51	0.65
<b>Dietary Intake Intention</b>			
Intention towards Food Frequency	3	0.48	0.63
Intention towards Nutrient diversity	3	0.55	0.67

agree=7. Both convergent and divergent validity were determined by comparing answers to each question measuring the same concept, then by measuring this answer to the respondent's response to a question that asks for the exact opposite answer. The questionnaire was developed from a previous qualitative study which incorporated all key constructs contained within the TPB and as such used both direct and indirect belief-based measures. This identified significant psychological and social related factors regarding optimal dietary behavior. Thematic content analysis was conducted to identify and summarize themes underlying the respondents' dietary intention. The questionnaire was acceptable based on factor analysis criteria used and since most concepts had their measurements loading with communalities for each item being greater than 0.5. It was essential to acknowledge that correlation coefficients varied from samples making reliability of factor analysis dependent on sample size. Moreover this questionnaire was acceptable having confirmed adequacy of sample size (n=220) using test of sphericity. The internal consistency estimates of the various concepts, using Cronbach's alpha, ranged from 0.60 to 0.68 for the main study (Table 1). The closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale. George & Mallery (2003) rule of thumb was used to classify the Cronbach's alpha coefficients generated. According to the rule of thumb; >0.9-Excellent, >0.8-Good, >0.7-Acceptable, >0.6-Questionable, >0.5- Poor and <0.4- Unacceptable. High values for Cronbach's alpha indicates good internal consistency of the items in the scales but does not necessarily signify that the scale is one-dimensional. Consequently, factor analysis was performed to establish the dimensionality (construct validity) of the scales in the questionnaire before being fitted into the structural equation modeling.

## Statistical Methods

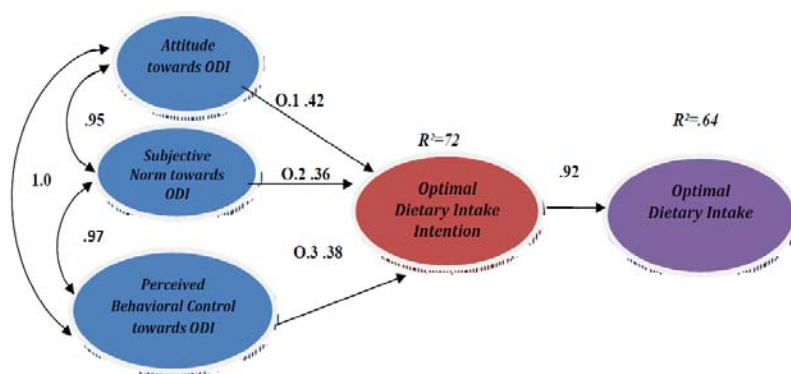
Data was entered into a SPSS version 15 to calculate for reliability tests where Cronbach's  $\alpha$  was used to assess the consistency of the questions. Values of Cronbach's  $\alpha$  were computed to evaluate the internal consistency of the attitudinal beliefs, social influences, control beliefs and intention scores (Table 1). George and Mallery's rule of thumb was employed to categorize the average of communalities of women's attitude, subjective norm, perceived behavioral control, and intention. To establish whether the model nested based on TPB variables applied to optimal dietary intake fitted the data

acceptably well, structural equation modeling using AMOS version 7 was conducted. Structural equation modeling was further used to determine the influence of attitude, subjective norm, perceived behavioral control and intention on dietary intake.

## Results and Discussion

Demographic factors investigated included marital status, religion, level of education, occupation, and income status. Among these characteristics, only income status significantly (where  $r=0.631$  and  $p\text{-value}=0.009$ ) influenced the nutrition status of the respondents. The findings of demographic features revealed that the highest proportion of the respondents (54 percent) earned less than 50 dollars per month. This has a direct impact of their dietary patterns which consequentially affects their already comprised immune status. Approximately, 40 percent of the respondents earned between 51 to 60 dollars per month, whereas the least proportion (6 percent) of the respondents earned more than 61 dollars in a month. The level of income mostly reflects the purchasing powers, diet diversity and patterns, and accessibility to medical care of an individual. Economic empowerment of women is crucial in general human development. Studies show that women authority within the households as proxy by earnings from paltry trading and education is positively correlated with improved household food and nutrition security [6,7]. According to the UNICEF (2006), an estimated 40 percent of the African populations live under conditions of food insecurity with women being the most vulnerable group. Food availability in the household mainly involves physical access to food in the household that is achieved through own production, purchase, exchange, gifts, relief and transfers (FAO, 2009).

This study reports low Cronbach alphas across the items which may be because of lack of homogeneity of variances among items, and also due to fewer items in the scale/factor. The most common criteria for fit indices that have been used by behavioral researchers are rules of thumb that lack a detailed mathematical or empirical justification [10]. These conventional rules of thumb and guidelines, used by researchers for the selection and interpretation of fit indices are often erroneous. Given complexity of issues the best of a situation is the degree of measure of subjectivity involved in determining whether a model fits well. It was found that the items characterizing attitude, subjective norm, perceived behavioral control and intention had high regression weights approaching to 1.00 (Figure 2). The relationships



**Figure 2:** Resulting Theory of Planned Behavior structural model applied to optimal dietary intake.

between observed variables in the model were significant with  $p < 0.001$  and positive. The goodness of fit was statistically non-significant at the 0.01 level but the model would be rejected at the 0.05 level ( $\chi^2 = 620.1$ ,  $df = 250$ ,  $p = 0.12$ ,  $df = 2.20$ ). Although the chi-square was under the recommended 3:1 range indicating acceptable fit after significant modification indices were un-associated. Other fit indices (TLI=0.50; CFL=0.55; RMSEA=0.062) also showed a good model fit. Hoelter's critical recommend that 215 is the smallest sample size that should be accepted at the 0.05 significance level the assumption that the default model is correct (Hoelter, 1983). If the sample size was smaller than 215 the default model would be rejected at 0.05. Hoelter's critical further recommends 260 is the largest sample size that would have accepted at the 0.01 significance level the assumption that the default model is correct [11]. Alternatively, if the sample size was bigger than 260 the default model would have been rejected at significance level of 0.01. It was necessary to calculate a bootstrapped chi-square value that recommends not less a 200 bootstrapped sample for a better model fit. The Bollen-Stine  $p = 0.251$  provided further confirmation about the model fit. The regression weights indicates that maternal attitude had a statistically significant influence on dietary intention ( $\beta = 0.42$ ,  $p < 0.01$ ,  $n = 220$ ). Indirect perceived behavioral control had a statistically significant influence on dietary intention ( $\beta = 0.38$ ,  $p < 0.01$ ,  $n = 220$ ). This was followed with subjective norm which had a statistically significant influence on dietary intention and behavior ( $\beta = 0.36$ ,  $p < 0.01$ ,  $n = 220$ ). Dietary intention was found to have a stronger prediction for dietary behavior ( $\beta = 0.92$ ,  $p < 0.001$ ,  $n = 220$ ).

The overall modeling fitting of the model shows that attitude, subjective norm and perceived behavioral control all influence the dietary intake of immune-suppressed women in Kakamega County. However, the woman's attitude plays a significant role in accentuating whether optimal dietary intake will be achieved or not. The findings of this study have a clinical implication to the health professionals who closely track the dietary intakes of their HIV/AIDS patients. It is crucial to improve their attitudes by educating them on advantages and disadvantages of optimal dietary intake on their health status. The people who influence their dietary intakes should also be enlightened on the impact of optimal dietary intake on their individual whose immune status is already comprised. These women living with HIV/AIDS should be packaged with strategies of boosting their self confidence so that they can be able to solely overcome the challenges and obstacles of optimal dietary intake. Since this study supports the use of Theory Planned Behavior in assessing factors which influence

optimal dietary intake in HIV/AIDS women. It is important that strategies used to promote optimal dietary intake amongst these women should incorporate women's beliefs on optimal dietary intake. Given that promotions are conducted without understanding the fundamental cause sub-optimal dietary intake amongst these women. The efficacy of the Theory of Planned Behavior has been illustrated on the model fit which implies that we understood optimal dietary intake amongst the HIV/AIDS women receiving therapeutic support from the three comprehensive care clinics in Kakamega County. In Kenya it is the norm that people without access to adequate food, income and land, especially women and girls, are more likely to be forced into situations that place them at risk of HIV infection [2]. High-risk situations can include migration and mobility for work, transactional or commercial sex or staying in high-risk or abusive sexual relationships due to economic or social dependency. Women are usually involved in producing, purchasing and preparing food. When a woman is HIV-positive, household food security is impacted, as these responsibilities shift to younger, more inexperienced women in the home [12]. Women are also primary caregivers. Therefore women have numerous roles to play despite their health status thus the aspect of optimal dietary is crucial for their compromised immune status [13]. Promoting the right knowledge and practices which can impact on dietary diversity and its frequency is essential in improving the attitude of an immune suppressed woman [14]. Significant people who are close to an immune-suppressed woman should also encourage and support the woman to feed optimally. For instance, a supportive family environment might motivate optimal nutrition, ART adherence and play an important role in supplying messages of hope. In order to capitalize on the strengths of significant others and family members, future research and policy programming should explore the potential of social pressure (subjective norm)-based interventions that can be used in conjunction with peer support interventions that aim to improve optimal dietary intake amongst HIV/AIDS women [15]. With regard to this active perspective, very few intervention studies have assessed the impact of social support especially from significant others on optimal dietary intake of HIV/AIDS women [16]. This study reveals that the success of an optimal dietary intake of HIV/AIDS women may be supported or hindered by the woman's surrounding social environment. Generally creation of a supportive environment and boosting the confidence of HIV/AIDS woman is a key for supporting her to overcome barriers optimal dietary intake.

## Conclusion

The relationships between attitude, social pressures (subjective norm) and perceived behavioral control generates higher levels of hope, which is an essential dimension in successfully promoting optimal dietary intake amongst HIV/AIDS women amongst other long-term challenges of HIV/AIDS. This study enhances the understanding of the important role played by a woman's attitudinal beliefs, social support beliefs and control beliefs in the optimal dietary intake dynamics of HIV/AIDS women.

## Authors' Contributions

All authors were involved with the drafting of the research paper, critically reviewed the manuscript and approved the final version submitted for publication.

## Acknowledgment

The authors sincerely thank participants who shared their experiences, and contributed needed information to the study. All those contributed to the success of this study in one way or another are also recognized.

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