

1 Original Research Article

2 **Relevance of food labels among selected students at the University of Cape Coast, Ghana**

3

4 **ABSTRACT**

5 Food labels are important public health tool that provides consumers with nutritional information
6 to make informed and healthier food choices. This study aimed at determining the level of
7 knowledge and understanding of nutritional information on food labels and its impact on food
8 choices among students at the University of Cape Coast, Ghana. A cross-sectional study
9 employing random sampling was used to recruit 200 study participants. A pre-tested structured
10 questionnaires were used to obtain data on socio demographic characteristics, frequency of food
11 label use and nutritional knowledge of the students. Pertaining to the frequency of food label use,
12 27.5% of students always use food labels, while 11% never use food labels. While most of the
13 students were aware that packaged foods have labels, most of them do not refer to information
14 on the labels when making purchases. Expiry date was considered the most important
15 information on food labels, while the students may refer to labels mostly for health reasons. The
16 students considered time wasting to be the major reason they might not refer to labels. However,
17 majority of the students know what constitutes a balanced diet and how it can be achieved. There
18 was no effect of gender, and level of study on the use of food labels, while no association was
19 observed between nutritional knowledge of the students and the use of food labels.

20 **Key words:** Food labels, pre-packed foods, nutritional information, students

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22 1. Introduction

23 A food label is described as the identity card of food products (Viola et al., 2016), which
24 additionally serves as a guide for the selection of consumable products to meet specific
25 nutritional needs of consumers. Food labels are a must for all pre-packed foods as it conveys
26 information about the composition, ingredients and the proportionate quantity. Additionally,
27 consumers obtain information on quality, origin, processing and preservatives in food (Viola et
28 al., 2016). Thus, food labels may inherently have protective and health-promoting properties if
29 the message it conveys is well understood and appropriately contextualized (Wahab, 2018).

30 On the other hand, patronage of convenient pre-packed foods, especially among young adults has
31 escalated (Miller & Cassady, 2015) and typically among students, not only for the convenience
32 and ease of accessibility, but also out of keen interest to explore exotic food products (Quaidoo
33 et al., 2018). This is of concern because some pre-packed foods may have issues of nutritional
34 inadequacies including the presence of allergens, high levels of saturated fats, sugars and salts, as
35 well as low dietary fibre and vitamins (Moz-Christofoletti&Wollgast, 2021). Thus, particular
36 attention to food labels may be necessary to reduce over-reliance on some pre-packed foods,
37 whose excessive consumption could pose severe health threats. Indeed, increasing rates of diet-
38 related diseases such as obesity, hypertension and diabetes has been observed in Ghana (Ofori-
39 Asenso et al., 2016) and other parts of the world (Lin et al., 2020). Apart from low physical
40 activity, consumption of (ultra) processed culinary food ingredients, which form the bulk of
41 energy-dense pre-packed foods are also implicated (Nardocci et al., 2021).

42 In Ghana, just as in other countries, food label policies and guidelines have been developed to
43 regulate the purchasing behaviour of consumers (Song et al., 2015). Among the mandatory
44 labelling requirements for pre-packed foods produced and/or consumed in Ghana are product
45 name, list of ingredients, processing aids and additives, and product weight or volume. Other
46 requirements include the name and address of the manufacturer, the country of origin, date of
47 manufacture, instruction for storage and usage, as well as batch/lot number (Food and Drugs
48 Authority, 2013).

49 According to Miller & Cassady (2015), consumers with prior nutritional knowledge show a
50 higher likelihood of effectively using a food label, and thus, benefit more from healthful
51 decisions based on the nutritional information. University students have a wide range of
52 academic programmes, which can expose students to different levels of nutritional information,
53 and thus, contribute to the use of food labels. We tested the strength of the inter relationships
54 between study programs, knowledge and understanding of food labels and the influence of the
55 latter on food choices. For this, the College of Health and Allied Sciences (COHAS) of the
56 University of Cape Coast, where diverse programmes including Clinical Nutrition and Dietetics,
57 Physician Assistant, Diagnostic Imaging Technology, Diagnostic Medical Sonography, Health
58 Information Management, Biomedical Sciences, Medical Laboratory, Sports Science, and
59 Optometry are run, was selected as a case study. The study contributes basic data that would be
60 useful for expanding avenues for acquisition of nutritional information, especially among young
61 adults for fully exploiting the advantages of food labels on pre-packed foods.

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63 2. Materials and Methods

64 2.1 Research design

65 A descriptive cross-sectional study was used to ascertain the knowledge level and understanding
66 of nutrition information on food labels, and its impact on food choices among students of the
67 University of Cape Coast.

68 2.2 Study population

69 The study population comprised students from the School of Allied Health Sciences at the
70 University of Cape. The school has a student population of over 4000 and runs 9 undergraduate
71 programmes in Clinical Nutrition and Dietetics, Physician Assistant, Diagnostic Imaging
72 Technology, Diagnostic Medical Sonography, Health Information Management, Biomedical
73 Sciences, Medical Laboratory, Sports Science, and Optometry.

74 2.3 Sample size and sampling procedure

75 Using the Cochran formula $N = Z^2 (1-p) (p)/b^2$, a sample size of 200 was used in this study.
76 Participants were selected using multistage sampling. A simple random sampling method was
77 employed to select 7 of the 9 programmes. To do this, the names of all 9 programmes were
78 written on pieces of papers, mixed up in a bowl and selected by the principal investigator while
79 blindfolded and without replacement.

80 To obtain a specific number of students from each programme, the total number of students in
81 each programme were divided by 7 and multiplied by the calculated sample size (200). Using
82 simple balloting method, pieces of folded papers with YES or NO written on them were mixed in
83 a bowl and given to the students to select. Students who selected YES and met the inclusion
84 criteria were recruited for the study.

85 2.4 Data collection procedures

86 Preceding the administration of the research instruments, the reason for the study was explained
87 to the respondents. Questionnaires were given to students who were willing to partake in the
88 study. Also, participants were educated on the voluntary nature of the study. Students willing to
89 participate were assured of high level of confidentiality. Students who were not comfortable with
90 the study were given the opportunity to voluntarily opt out.

91 2.5 Data processing and analysis

92 Data entry and analysis was carried out in SPSS version 22.0. Chi-square test was carried out to
93 assess the statistical association between socio demographic characteristics such as gender,
94 department, and level of study, and the frequency of food label use.

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96 3. Results

97 3.1 Overall response

98 Demographic characteristics showed that majority (96%) of respondents were within the age
99 range of 18 to 29 years, while 6 and 2 respondents, respectively, were above 30 years and below
100 18 years (Table 1). Also, more than half (55%) of the respondents were males. Among the
101 different programmes of study, the highest (23.5) and least (4.5 %) number of respondents were
102 from Clinical Nutrition and Dietetics, and Sports Science, respectively, while students in the
103 second year of study (level 200) participated more in the study (36%) compared to the other year
104 groups (Table 1).

105 Information about usage of food labels show that less than 30% of respondent always use food
106 labels, while about 11% never use food labels (Table 2). Most of the respondents (91.5%) were
107 aware that packaged foods have labels although 28% do not consider these labels when
108 purchasing food. Additionally, 88% of the respondents revealed that food labels can be helpful at
109 the time of purchasing pre-packed foods.

110 According to 73.3% of the respondents, the most important information on a food label is the
111 expiry date (Table 3), while information on ingredients was considered important by 19.2%.
112 Information on the weight/volume of product was not considered important by any of the
113 respondents, while the method of preparation, name of producer and brand name were
114 considered important by 1.7, 0.8, and 5.0% of the respondents, respectively.

115 About 61.6% of the respondents read food labels for health reasons, 17.7 and 12.1% read due to
116 concerns with food allergies, and taste and flavour, respectively, while only 8.6% read labels to
117 know the content of the product. The major reason why the respondents may not refer to food
118 label is related to time wasting (52.7%), although getting confused (19.8%) and not knowing
119 how to use information on food labels (17.4%) were also observed (Table 3).

120 With respect to nutritional knowledge (Table 4), about 69.5% of respondents answered correctly
121 the question on what constitutes a balanced diet, although 3.5% said they did not know what
122 constitutes a balanced diet. Additionally, 85.5% of the respondents had an idea how a balanced
123 meal can be achieved, although only about 52% of the respondents know the major nutrients
124 needed by the body.

125 3.2 Influence of gender on food label use and nutritional knowledge

126 The usage of food labels among the respondents show that 32.91 and 28.15% of females and
127 males, respectively, used food labels always, while 6.33 and 14.56% do not use food labels
128 (Table 5). Chi-square test revealed no significant effect of gender on the use of food labels. Also,
129 more than 85% of both genders were aware that packaged foods have labels, although about 27%
130 do not consider these labels when purchasing food. Additionally, 17.78 and 7.27% of females
131 and males, respectively, do not consider labels helpful when purchasing food.

132 With respect to the nutritional knowledge of the respondents, 74.44 and 65.45%, respectively, of
133 females and males know the minimum requirement to achieve a balanced diet, while more than
134 85% of both gender have an idea about what to consume to achieve a well-balanced diet. On the

135 contrary, only 47.78 and 55.45% of females and males, respectively, know the major nutrients
136 needed by the body (Table 5).

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138 **3.3 Influence of programme of study on food label use and nutritional knowledge**

139 The frequency of food label among the different programmes of study show that majority of
140 students use food labels intermittently (Table 6). Students of Diagnostic Medical
141 Sonography reported the highest percent for never using food labels (27.78%), while Sports
142 Science students had the highest for always using food labels (44.44%). Majority of students
143 (>70%) were aware that packaged foods had labels and considered them helpful, with more than
144 50% considering the information of food labels prior to purchasing.

145 More than 70% of students in Clinical Nutrition and Dietetics, Biomedical Sciences, Physician
146 Assistant and Sports Science knew the composition of a balanced diet. A similar observation was
147 also made with respect to knowledge about the of major nutrients needed by the body. Also,
148 most of the students in the different study programmes knew how a balanced diet can be
149 obtained (Table 6).

150 **3.4 Influence of level of study on food label use and nutritional knowledge**

151 Among the different levels of study, 41.67% of level 400 students always use food labels
152 compared to 23.08, 26.15 and 39.02% of levels 100, 200 and 300, respectively. (Table 7). While
153 level 400 students recorded the highest for the group who always use food labels (41.67%), the
154 group also recorded the highest among the different levels who never use food labels (16.67%).
155 Chi-square test revealed no significant effect of level of study on the use of food labels.
156 Although, about 90% of the students in the different levels of study were aware that packaged
157 foods have labels, about 35% of levels 100 and 300 students do not consider such labels when
158 buying food, while about 20% of level 200 students do not consider labels helpful when
159 purchasing food.

160 About 66% of level 100 students know what constitutes a balanced diet (Table 7). This improved
161 to 84.72% for level 200 students, however, a low number of (45.45%) of level 300 students
162 know what constitutes a balanced diet. Similarly, only 68.18% of level 300 students know how a
163 balance meal can be obtained compared to the over 85% of students observed in the other levels
164 of study. Likewise, only 29.54% of level 300 students know the major nutrients needed by the
165 body, compared to the over 55% observed for the other levels of study.

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170 4. Discussion

171 The current study shows a low usage of food labels among the students, although a high
172 awareness about the presence of food labels on packaged foods was observed. The proportion of
173 students who read food labels is similar to that observed in a similar study carried by Madilo et al
174 (2020). **Understanding nutritional information has been observed to be among the major factors**
175 **limiting the usage of food labels.** In a study conducted in Malawi among 60 consumers, only
176 7.3% were reported to understand the nutritional information on food labels (Kasapila&Shawa,
177 2011). Also, a study conducted in China reported that only 3.3% of respondents understood
178 nutrition information on food labels (Song et al., 2015). A 2018 study conducted in Bahrain
179 among 430 consumers showed that only 42% actually read and understood the nutrition
180 information on food labels (Wahab, 2018a). Also, according to Norazmir et al. (2012) about
181 53.6% of the respondents in Malaysia do not use food labels because they had limited knowledge
182 in nutrition. In this study, however, majority of the students had some knowledge about nutrition,
183 and thus could read and interpret nutritional information on food labels. Hence the low usage of
184 food labels among the students goes to confirm the observation of Quigley and Watts (2014) that
185 education level does not influence the usage of food labels by consumers.

186 Although majority of the respondent considered food labels to be helpful, its usage in making
187 food choices was low. This observation is similar to that made by Song et al. (2015), showing
188 that the impact of food labels in food selection is low. This study however, showed that food
189 labels are mostly read for health reasons. According to Vemula et al. (2014), women usually read
190 labels to know the content of food packages, especially fats and sugars, as excess consumption of
191 these two ingredients is known to promote weight gain. This shows that gender can affect the use
192 of food labels, although no influence of gender on food label use was observed in this study.

193 One major reason limiting the use of food labels observed in this study was the perception that
194 reading food labels amounts to time wasting, although concerns with food allergy and the
195 confusing nature of labels was observed. A similar report was made in a study conducted by
196 Jacobs et al. (2011). However, other studies have reported that labels are not read by consumers
197 due to other factors such as poor organization and presentation on packages (Besler et al., 2012),
198 and their complexity to understand (Saha et al., 2013). This implies that labels on food packages
199 should be simplified for easy reading and understanding by consumers.

200 With respect to the different demographics characteristics, it was observed that neither gender
201 nor level (year) of study had an influence on the frequency of food labels use. A Chi-square test
202 also showed no association between the nutritional knowledge of the students and the frequency
203 of food labels, which affirms the observation of Quigley and Watts (2014). Indeed, a low interest
204 in reading food labels have been observed in other studies carried out in Ghana (Ababio et al.,
205 2012; Darkwa, 2014; Madilo et al., 2020; Nimoh et al., 2021). **The low usage of food labels**
206 **among students may have health implications due to the increasing demand for pre-packaged**
207 **foods.** The low nutritional content of some pre-packaged foods, coupled with increasing issues of
208 food adulteration means that consumers need to be vigilant to know the content of foods
209 consumed. Hence, educating students and the general populace on the importance and usage of
210 food labels food choices must be intensified.

211 5. Conclusions

212 Less than a third of the students always refer to food label when purchasing pre-packaged foods,
213 even though majority of the students are aware that packaged foods have labels. Also, most
214 students do not refer to information on food labels when making purchases. Among the
215 information of labels, expiry date was considered the most important information on pre-
216 packaged foods, while the students may refer to labels mostly for health reasons. Among the
217 factors limiting the use of labels, time wasted reading labels was considered the most prominent.
218 There was no effect of gender, and level of study on the use of food labels, while no association
219 was observed between nutritional knowledge of the students and the use of food labels.

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Tables277 **Table 1:** Socio-demographic characteristics of respondents

Variable	Frequency (%)
<i>Age</i>	
<18	2 (1.0)
18-29	192 (96.0)
30 years and above	6 (3.0)
<i>Gender</i>	
Male	110 (55.0)
Female	90 (45.0)
<i>Programme of Study</i>	
Clinical Nutrition and Dietetics	47 (23.5)
Physician Assistant	24 (12.0)
Diagnostic Medical Sonography	18 (9.0)
Diagnostic Imaging Technology	8 (4.0)
Health Information Management	38 (19.0)
Biomedical Sciences	19 (9.5)
Optometry	18 (9.0)
Medical Laboratory	19 (9.5)
Sports Science	9 (4.5)
<i>Level of Study</i>	
100	56 (28.0)
200	72 (36.0)
300	44 (22.0)
400	28 (14.0)

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281 **Table 2:** Usage of food labels among the respondents.

Variable	Frequency (%)
<i>How often do you read food labels?</i>	
Always	55 (27.5)
Sometimes	107 (58.8)
Never	20 (11.0)
<i>Are you aware that packaged foods has labels?</i>	
Yes	138 (91.5)
No	17 (8.5)
<i>Do you consider labels when buying packaged foods?</i>	
Yes	144 (72.0)
No	56 (28.0)
<i>Are labels helpful when purchasing foods?</i>	
Yes	176 (88.0)
No	24 (12.0)

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UNDER PEER REVIEW

284 **Table 3:** Factors affecting the usage of food labels

Variable	Frequency (%)
<i>Which information on food labels is the most important to you?</i>	
Ingredients	38 (19.2)
Expiry date	147 (73.3)
Weight/volume of product	0 (0)
Method of preparation	3 (1.7)
Name of Producer	2 (0.8)
Brand name	10 (5.0)
<i>Why do you read food label?</i>	
I experience food allergy	35 (17.7)
For health reasons	122 (61.6)
Concerns on taste and flavor	24 (12.1)
To know the content of the food product	17 (8.6)
<i>Why don't you read food labels?</i>	
I do not know how to use	29 (17.4)
Label is not attractive	15 (9.0)
It is time consuming	88 (52.7)
It is confusing	33 (19.8)
Some beverages don't have labels	2 (1.2)

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289 **Table 4:** Assessing the nutritional knowledge of respondents

Variable	Frequency (%)
<i>A balanced diet contains the following nutrients:</i>	
More proteins and carbohydrates (MPC)	22 (11.0)
Carbohydrates, fats and protein (CFP)	25 (12.5)
Fats, minerals and vitamins (FMV)	7 (3.5)
Carbohydrate, fats, protein, vitamins and minerals (CFPVM)	139 (69.5)
Don't Know (DK)	7 (3.5)
<i>You can consume a well-balanced diet by eating:</i>	
A lot of foods (LF)	14 (7.0)
Expensive foods (EF)	6 (3.0)
A lot of meat (LM)	4 (2.0)
A variety of foods (VF)	171 (85.5)
Cheap but delicious foods (CDF)	5 (2.5)
<i>What are the major nutrients needed by the body?</i>	
Carbohydrates, vitamins and minerals (CVM)	34 (17.0)
Carbohydrates, protein and fats (CPF)	104 (52.0)
Vitamins and minerals (VM)	15 (7.5)
Carbohydrates and Protein (CP)	18 (9.0)
Protein, vitamins and minerals (PVM)	29 (14.5)

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Table 5: Effect of Gender on Food label use and nutritional knowledge.

Gender	Question/Response/Frequency				
	<i>How often do you read nutrition labels?</i>				
	Always	Sometimes	Never		
Female	26	48	5		
Male	29	59	15		
	<i>Are you aware that packaged foods have labels?</i>				
	Yes	No			
Female	77	13			
Male	106	4			
	<i>Do you consider labels when buying packaged foods</i>				
	Yes	No			
Female	66	24			
Male	78	32			
	<i>Are labels helpful when purchasing foods?</i>				
	Yes	No			
Female	74	16			
Male	102	8			
	<i>A balanced diet contains the following nutrients</i>				
	MPC	CFP	FMV	CFPVM	DK
Female	9	5	4	67	5
Male	13	20	3	72	2
	<i>You can consume a well-balanced diet by eating</i>				
	LF	EF	LM	VF	CDF
Female	8	2	0	76	4
Male	6	4	4	95	1
	<i>What are the major nutrients needed by the body?</i>				
	CVM	CPF	VM	CP	PVM
Female	18	43	7	5	17
Male	16	61	8	13	12

Table 6: Effect of Programme of Study on Food label usage and nutritional knowledge.

Programme of study	Question/Response/Frequency		
	<i>How often do you read nutrition labels?</i>		
	Always	Sometimes	Never
Clinical Nutrition and Dietetics	2	13	1
Physician Assistant	18	23	3
Diagnostic Medical Sonography	0	8	0
Diagnostic Imaging Technology	4	9	5
Health Information Management	15	16	7
Biomedical Sciences	3	10	0
Optometry	1	10	1
Medical Laboratory	8	13	3
Sports Science	4	5	0
	<i>Are you aware that packaged foods have labels?</i>		
	Yes	No	
Clinical Nutrition and Dietetics	19	0	
Physician Assistant	46	1	
Diagnostic Medical Sonography	8	0	
Diagnostic Imaging Technology	18	0	
Health Information Management	32	6	
Biomedical Sciences	19	0	
Optometry	13	5	
Medical Laboratory	19	5	
Sports Science	9	0	
	<i>Do you consider labels when buying packaged foods</i>		
	Yes	No	
Clinical Nutrition and Dietetics	15	4	
Physician Assistant	40	7	
Diagnostic Medical Sonography	1	7	
Diagnostic Imaging Technology	12	6	
Health Information Management	22	16	

Biomedical Sciences	14	5
Optometry	10	8
Medical Laboratory	21	3
Sports Science	9	0

Are labels helpful when purchasing foods?

	Yes	No	
Clinical Nutrition and Dietetics	16	3	19
Physician Assistant	43	4	47
Diagnostic Medical Sonography	8	0	8
Diagnostic Imaging Technology	18	0	18
Health Information Management	34	4	38
Biomedical Sciences	12	7	19
Optometry	14	4	18
Medical Laboratory	22	2	24
Sports Science	9	0	9

A balanced diet contains the following nutrients

	MPC	CFP	FMV	CFPVM	DK
Clinical Nutrition and Dietetics	0	10	0	9	0
Physician Assistant	0	5	2	40	0
Diagnostic Medical Sonography	3	0	1	4	0
Diagnostic Imaging Technology	0	0	0	18	0
Health Information Management	8	7	0	21	2
Biomedical Sciences	4	0	2	13	0
Optometry	0	1	2	10	5
Medical Laboratory	7	0	0	17	0
Sports Science	0	2	0	7	0

You can consume a well-balanced diet by eating

	LF	EF	LM	VF	CDF
Clinical Nutrition and Dietetics	2	0	0	16	1
Physician Assistant	2	0	0	43	2
Diagnostic Medical Sonography	1	0	0	7	0
Diagnostic Imaging Technology	0	0	0	18	0

Health Information Management	4	4	4	26	0
Biomedical Sciences	3	2	0	12	2
Optometry	0	0	0	18	0
Medical Laboratory	0	0	0	24	0
Sports Science	2	0	0	7	0

What are the major nutrients needed by the body?

	CVM	CPF	VM	CP	PVM
Clinical Nutrition and Dietetics	5	5	0	6	3
Physician Assistant	3	39	0	1	4
Diagnostic Medical Sonography	1	5	0	0	2
Diagnostic Imaging Technology	5	9	0	1	3
Health Information Management	10	9	9	3	7
Biomedical Sciences	4	6	2	4	3
Optometry	3	7	4	0	4
Medical Laboratory	3	16	0	2	3
Sports Science	0	8	0	1	0

Table 7: Effect of Level of Study on Food label usage and nutritional knowledge.

Year of Study	Question/Response/Frequency				
	<i>How often do you read nutrition labels?</i>				
	Always	Sometimes	Never		
100	12	33	7		
200	17	43	5		
300	16	21	4		
400	10	10	4		
	<i>Are you aware that packaged foods has labels?</i>				
	Yes	No			
100	50	6			
200	67	5			
300	39	5			
400	27	1			
	<i>Do you consider labels when buying packaged foods</i>				
	Yes	No			
100	36	20			
200	56	16			
300	29	15			
400	23	5			
	<i>Are labels helpful when purchasing foods?</i>				
	Yes	No			
100	51	5			
200	59	13			
300	40	4			
400	26	2			
	<i>A balanced diet contains the following nutrients</i>				
	MPC	CFP	FMV	CFPVM	DK
100	7	9	1	37	2
200	2	3	3	61	3
300	11	9	2	20	2
400	2	4	1	21	0
	<i>You can consume a well-balanced diet by eating</i>				
	LF	EF	LM	VF	CDF
100	2	0	0	53	1
200	5	0	0	64	3
300	4	6	4	30	0
400	3	0	0	24	1
	<i>What are the major nutrients needed by the body?</i>				

	CVM	CPF	VM	CP	PVM
100	9	30	1	4	12
200	12	40	3	12	5
300	9	13	11	1	10
400	4	21	0	1	2

UNDER PEER REVIEW