



Abstract

Individuals with celiac disease must adhere to a gluten-free (GF) diet in order to preserve gut health and ensure absorption of essential nutrients. Gluten proteins are found in products containing wheat, barley, rye, and contaminated oats. Avoidance of gluten is a challenge when baking, since gluten plays a vital role in the structure of baked products. When baking at higher altitudes, ingredients may need to be adjusted to compensate for lower atmospheric pressure. Gluten-free baking has not been studied extensively with restrictions for high-altitude baking.

The study objective was to develop and administer a survey to determine the types of information most useful to consumers baking gluten-free products at higher altitudes. Survey results will be used in the development of outreach materials for the public via the CSU Extension website.

A 10-question survey targeted common issues with home baking at higher altitudes. Survey participants who baked GF at elevations above 3500 feet were recruited from Colorado, Utah, Wyoming, and Montana through celiac support groups, Extension agents, and administrative professionals. In addition to the survey, a variety of high altitude tested gluten-free recipes were standardized for the webpage.

Survey respondents were highly motivated and experienced bakers. Of the 142 survey respondents, 38.5% reported following a GF diet for more than 5 years and 38.7% reported they were very confident in their baking skills. Recipes for high-altitude-ready GF yeast breads were requested by 55.6% of survey respondents. Information regarding dining out GF (61.3%), buying local GF foods (58.5%), and buying GF ingredients in bulk (44.4%) were identified as topics of interest for future outreach materials. Data from this study provided an assessment of baking skills and informational needs for those baking GF at higher altitudes.



QR Code and Link
Gluten-free information on
CSU Farm to Table website
www.farmtotable.colostate.edu

Objectives

- Develop and administer a survey to determine information most useful to home bakers of gluten-free products $\geq 3,500$ feet above sea level
- Convey useful, easily understandable information to the public applicable to their home-baking practices via a webpage on Colorado State University's Extension website

Methods

A cross-sectional design was used to develop a survey to gather information regarding current attitudes, practices, knowledge and needs of consumers interested in gluten-free baking at high altitudes. A 10-question survey was administered either online or on paper. Questions were based on common problems reported with baking at high altitudes, common problems experienced by gluten-free home bakers, and a search of current literature. A pilot test of the survey was implemented with selected Colorado State University graduate students. Their evaluations as well as those of multiple CSU faculty were taken into account in developing the final survey.

The targeted population for this study consisted of people who follow, or prepare food for someone following, a gluten-free diet, bake at home, and live at high altitude ($>3,500$ feet above sea level). The sample population was drawn from celiac support groups in Fort Collins, Denver, and Boulder, CO, as well as Wyoming, Montana and Utah. In addition, Extension agents from CSU, the University of Wyoming and Utah State University shared the survey with prospective participants. To further expand possible survey participants, the administrative list serve at CSU was also contacted.

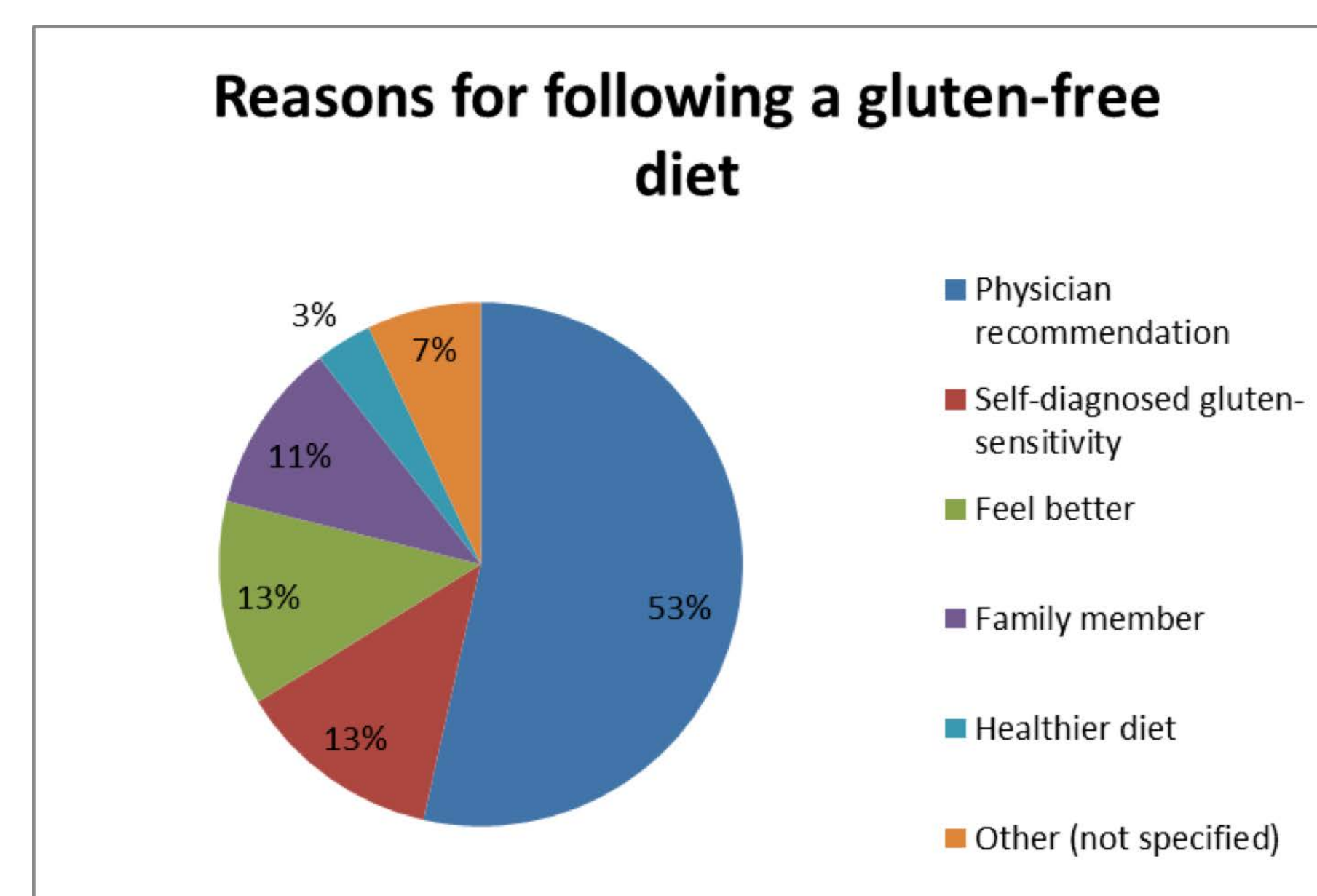


Figure 2. Why do you follow a gluten-free diet? (n=142)
Respondents were to choose "physician recommendation" or "other" and could write in a specific reason for "other." Those reasons were grouped together as self-diagnosed gluten-sensitivity, respondent feels better, family member follows a gluten-free diet, it's a healthier diet option, and not otherwise specified.

Results

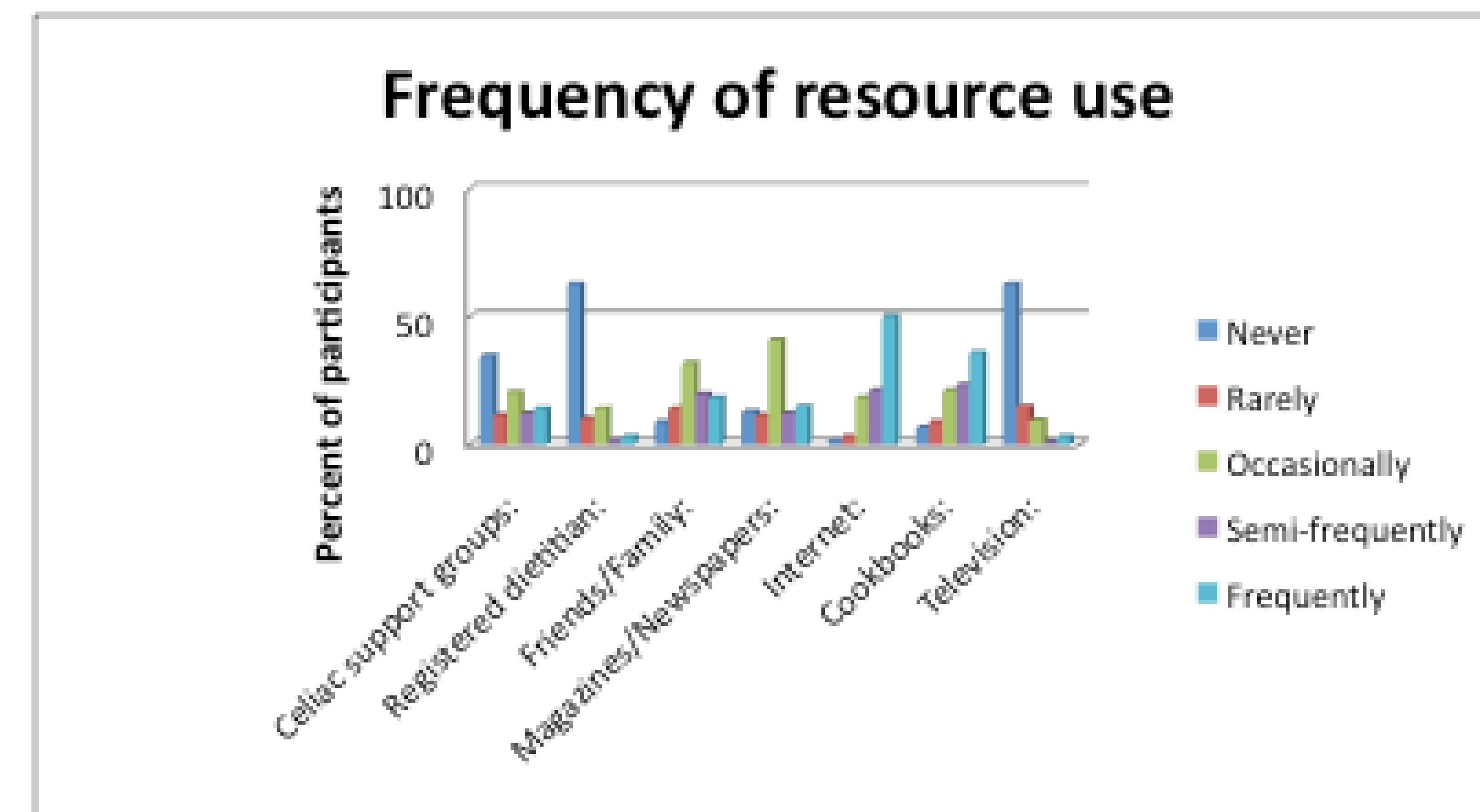


Figure 1. Ranking of information sources by frequency of use. (n=142)
The most frequently used information source was reported to be the Internet.

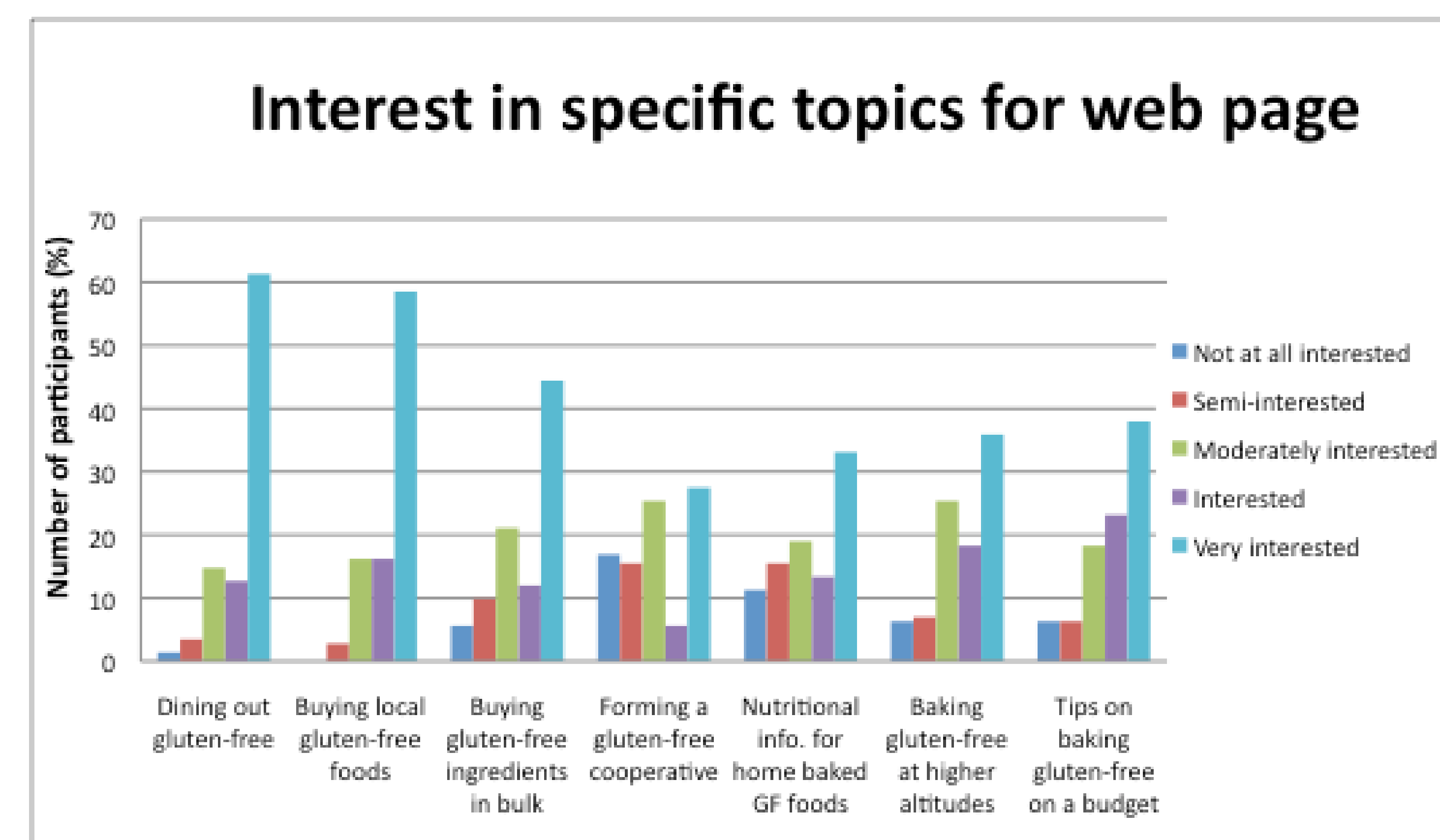


Figure 4. What topics would be of interest to you? (n=142)

References

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Conclusions

- A wide variety of information has become available and commonly used by the general public regarding gluten-free baking in the forms of websites, blogs, cookbooks, and television programs.
- A great need exists for high altitude-adjusted, gluten-free recipes that are readily accessible to the public as combining gluten-free baking recipes with the necessary adjustments for baking at high altitudes can pose a confusing and frustrating task for home bakers.
- Results from the survey indicated a need for yeast bread recipes as well as various specific topics for a web page.
 - Topics requested included dining out gluten-free, buying local gluten-free foods, and buying gluten-free ingredients in bulk.
- An expansion of the Colorado State University Extension website may be a viable next step:
 - Addition of instructional videos or testimonials from local celiac patients.
 - Analyze quality of information on various websites using a rating scale based on consistency with the literature, scope of information, and how easily it is understood.
- Other directions of future research may entail delving deeper into the celiac patient population's cooking habits.
 - For those who do not choose to bake in their homes, or are uncomfortable with their baking skills, resources to improve these skills could be developed.
 - The reasons for individuals' avoidance of baking gluten-free products in their home may need to be investigated first.



Figure 3. Which products would recipes or baking tips be helpful? (n=142)

Acknowledgements

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