Reasons for the Disconnect between Dietary Recommendations and Legume Consumption Patterns in U.S. Adults

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Presenter:

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Approved for 1 CPE (Level 2) by the Commission on Dietetic Registration

Bean Academy webinars

The Michigan Bean Commission (MBC) is pleased to offer a series of free accredited webinars, many with a plant-forward eating focus, that cover a broad range of contemporary nutrition and food topics.

Webinars are a blend of research, science and practice to help nutrition professionals stay informed on recent developments on relevant topics.

Webinars are funded as part of a 2021-2022 USDA grant to the Michigan Bean Commission.

Webinar logistics

- A Handout of the slides presented today is available at: https://michiganbean.com/hp-webinar-bobe-presn/
- The Continuing Education Credit certificate is available to download after the webinar: https://michiganbean.com/hp-webinar-bobe-ceu/
- The presenter will answer questions at the end of this webinar. Please submit questions by using the 'Q&A' feature on your computer screen.

Today's Faculty

- **Gerd Bobe, Ph.D.**
  - Associate Professor, Oregon State University
  - Principal Investigator at the Linus Pauling Institute
- Moderator:
  Barbara J. Ivens, MS, RDN, FADA, FAND – Consultant, Michigan Bean Commission

Learning Objectives

Upon completion of this webinar participants will be able to:

- Describe the disease prevention benefits of regular legume consumption
- Outline current U.S. legume consumption patterns
- State consumer perceptions and barriers to regular legume consumption
- Identify approaches to promote regular legume consumption

Michigan BEAN COMMISSION

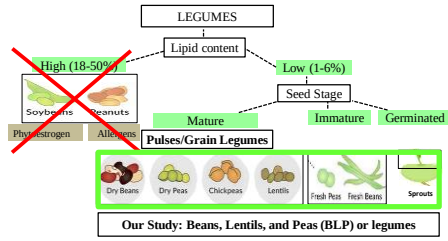
REASONS FOR THE DISCONNECT BETWEEN DIETARY RECOMMENDATIONS AND LEGUME CONSUMPTION PATTERNS IN U.S. ADULTS

Evidence from the National Health and Nutrition Examination Survey (NHANES) 2011-2014 and Beans, Lentils, Peas (BLP) 2017 Survey

Gerd Bobe, Thushanthi Perera, and Candace Russo
Linus Pauling Institute and College of Public Health and Human Sciences, Oregon State University, Corvallis, OR, USA

Legumes and BLP Definition

Botanical: Plant family (Fabaceae formerly Leguminosae) of dicotyledonous herbs, shrubs, and trees that are named after their fruit (FAO).



Why Promote Legumes?

Nutritional Benefits	Source of Protein	High in Iron and Zinc
Low in Lipids		Low in Sodium
High in PUFA		Packed with B Vitamins especially Folate
Zero Cholesterol		Rich in Antioxidants and Flavonoids
	Low Glycemic Index	Gluten Free
	High in Fiber	

Solution: Proper preparation methods and pairing legumes with whole grains

Imbalanced AA Profile	High Starch Content	High in Protease Inhibitors
High in Galacto-oligosaccharides	High in Phytic Acid	High in Lectins

Why Promote Legumes? Environmental Reasons

2016: International Year of the Pulses

Grown in Nearly All Climates

Economically Accessible and Multipurpose

Highly Water Efficient

Foster Sustainable Agriculture

Essential Part in the Biodiversity

Food Security

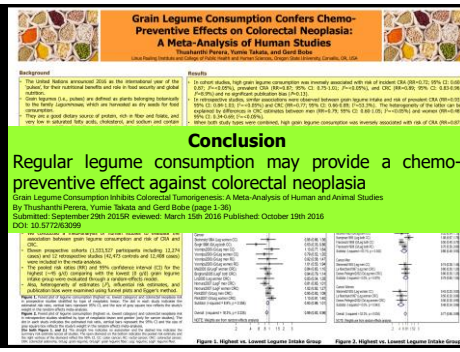
http://www.fao.org/pulses-2016/en/

Why Promote Legumes? Disease Prevention

Daily legume consumption may prevent obesity and chronic diseases (Aune et al., 2011; Zhu et al., 2015; Perera et al., 2016).

Justification for Meta-Analysis

- In 2007, WCRF/AICR Conclusions regarding the relation between legume consumption and colorectal cancer (CRC): **"Limited – No Conclusions"** because of limited data available.
- Re-evaluate the relation between legume consumption and colorectal adenoma (CRA) and CRC risk.


Grain Legume Consumption Confers Chemo-Preventive Effects on Colorectal Neoplasia: A Meta-Analysis of Human Studies

Thushanthi Perera, Yumie Takata, and Gerd Bobe

Background

Results

Conclusion

Regular legume consumption may provide a chemo-preventive effect against colorectal neoplasia

Grain Legume Consumption Inhibits Colorectal Tumorigenesis: A Meta-Analysis of Human and Animal Studies

By Thushanthi Perera, Yumie Takata and Gerd Bobe (page 1-36)

Submitted: September 28th 2015R evewed: March 15th 2016 Published: October 19th 2016

DOI: 10.5772/63099

Figure 1. Highest vs. Lowest Legume Intake Group

Figure 2. Highest vs. Lowest Legume Intake Group

Aim 1: Conclusion

Can regular legume consumption prevent chronic diseases?	Yes

Do U.S. Adults Consume Legumes Regularly?

Legume Consumption Patterns:

- CSFII 1994-1996:
  - Nearly **14%** of adults consumed dry beans on a given day (Lucier et al., 2000)
- NHANES 1999-2002:
  - **7.9%** of adults consumed dry BLPs on a given day (Mitchell et al., 2009)
  - **11.6%** of adults consumed dry beans on 2 given days (Papanikolaou & Fulgoni, 2008)

Current legume consumption pattern unknown

NHANES: Overview

Participants:

- 11,855 adults >18 yrs age (excludes pregnant & lactating women) from two NHANES cycles (2011-2012: 5,807 and 2013-2014: 6,048).
- Participants completed 2, non-consecutive multiple pass 24-hr dietary recalls (only dietary data coded as reliable were included). A total of 513 out of ~8,600 food codes were identified as legume containing.

Legume Group

- Green beans/peas
- Sprouted beans/peas
- Dry beans
- Dry peas
- Lentils
- Others (Chickpeas/ Garbanzo beans/Cowpeas/ Black eyed peas/pigeon peas)

Serving Size and Frequency

- ¼ cup (43.5g)
- ½ cup (87.5g)
- 1 cup (175g)
- Day 1
- Day 2

Data Analysis

- Legume dishes were weighted according to USDA FANDB to better reflect amounts eaten for mixed dishes.
- Data analysis was performed using STATA software (version 14).

NHANES: Most Recent Legume Consumption in the U.S.

Legume Intake	(cups/d)
Total	0.12
Dry Beans	0.06
Green Beans/peas	0.04
Other	0.02

73.1%

Only quarter of US population consumes legumes

Legume Consumption Patterns in US Adults: National Health and Nutrition Examination Survey (NHANES) 2011–2014 and Beans, Lentils, Peas (BLP) 2017 Survey
Thushanthi Perera 1, Candace Russo 2, Yume Takata 1 and Gerd Bobe 2,*
Received: 4 April 2020; Accepted: 24 April 2020; Published: 27 April 2020
Nutrients 12(5): 1237

DG PPT

None 0 | Marginal 0.01-0.24 | Healthy 0.25-0.49 | Disease Prevention >0.50

Legume Consumption (cups/d)

N=120

Aim 2: Conclusion

Can regular legume consumption prevent chronic diseases?	Yes
Do U.S. adults consume legumes regularly?	No

BLP (IRB# 8303): Overview

- Target Group: HYP parents/guardians

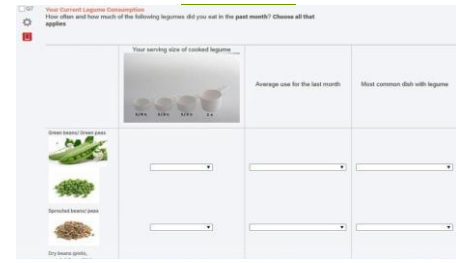
HYP: Outreach branch of LPI providing evidenced-based cooking, nutrition, and garden-based programs through hands-on education (local, community focus)

- Survey Started: November 15, 2017
  Reminders: 11-27 & 12-4 2017
  Closed: December 13, 2017
- Listserv Participants: n=949
  Started Survey: n=164
  Used: n=143 (completed >40%, Q. 1-6)
- 14 questions
  Completed ≤ 10 min: 71%
  Median Completion: 8:46 min
  FFQ recall duration: Past month

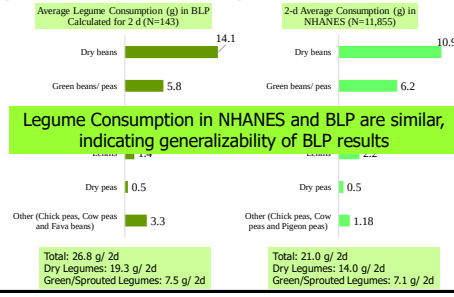
Gender: 85% females
Age: 91% 26-55 yrs old

BLP: Current Legume Consumption Pattern

"How often and how much of the following legumes did you eat in the past month? Choose all the applies.
Your service size of cooked legume, average us last month, most common dish with legume"



Comparison between Legume Consumption in NHANES and BLP

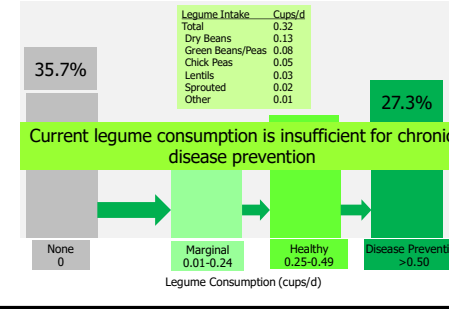


Legume Consumption in NHANES and BLP are similar, indicating generalizability of BLP results

Total: 26.8 g/ 2d
Dry Legumes: 19.3 g/ 2d
Green/Sprouted Legumes: 7.5 g/ 2d

Total: 21.0 g/ 2d
Dry Legumes: 14.0 g/ 2d
Green/Sprouted Legumes: 7.1 g/ 2d

BLP: Current Legume Consumption



Aim 3: Conclusion

Can regular legume consumption prevent CRC?	Yes
Do U.S. adults consume legumes regularly?	No
Do BLP respondents consume legumes regularly?	No
Is there a disconnect between dietary recommendations and legume consumption ?	?

How to Promote Legume Consumption?

U.S. programs that promote legumes:
- SNAP-ED (targets low income families)

Food Hero

Quantitative & easy to understand information about legume preparation methods and recipes
- Food Hero has no legume food category

- School Lunch Program
  - 0.5 cups/wk legumes
  - Chosen only for lunch
  - Chosen only as part of vegetable option

- **International programs** that promote legumes:
  - FAO
  - Pulse Canada

Current Challenges for Legume Promotion

Consumer Perceptions:
- Replacement food group for vegetable or meat ("poor man's meat")
- No known healthy benefits specific to legumes
- Concerns regarding (anecdotally):
  - Digestive health (paleo diet)
  - Anti-nutritional compounds/toxins (paleo diet)
  - High CHO content (whole 30, keto diet)
  - Taste (starchy, grainy, earthy taste)
  - Texture (pasty texture)
  - Preparation time (soaking)
  - Preparation challenge (cooking time, tasty recipes)
- Inconsistent definitions and categorization for legumes (USDA puts legumes into 6 food categories)

Framework for Promoting Legumes (+Current Challenges)

		Nutritional Concept	**Legumes**
1	Diet/Dietary Guidelines (DG)		DG for legume food group (2015) Regular: **1.5 cups/wk** (37.5 g/d) Vegetarian: **3 cups/wk** (75 g/d)
		Nutritional Application	
2	MyPlate		No place on MyPlate
		Culinary Application	
3	Meal		If present, legume types part of protein or vegetable food group
4	Dish/Recipe		Mostly bean/pea main/side dishes

Beans, Lentils and Peas Nutrition Education Survey (BLP)

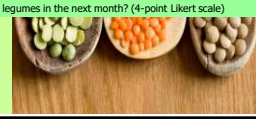
Aim 4A: Evaluate perceived importance of legume consumption

Health Belief Model

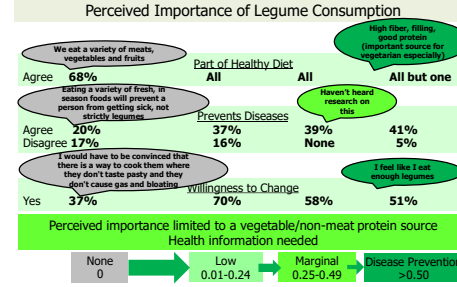
Perceived Importance | **Intentions to Act**

Select one and please explain your choice:

- I consider regular legume consumption a part of a healthy diet (5-point Likert scale)
- Regular legume consumption will prevent me from getting sick (5-point Likert scale)
- Would you be interested in eating more legumes in the next month? (4-point Likert scale)



Perceived Importance of Legume Consumption



Aim 4A: Consumer Perceptions

Can regular legume consumption prevent chronic diseases? | Don't Know

Beans, Lentils and Peas Nutrition Education Survey (BLP)

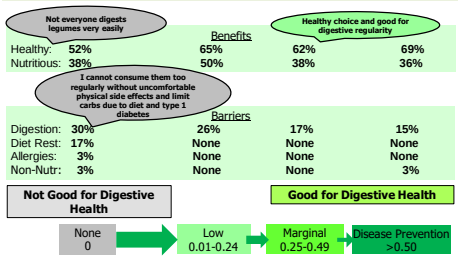
Aim 4B: Evaluate benefits & barriers for legume consumption

Attitudes and Believes

- The **top 3 benefits** for me to eat legumes are:
Delicious, Affordable, Available, Part of my culture, Good for health, Rich in nutrients, Easy to prepare, Know many tasty recipes, Protect environment, Other (please specify).

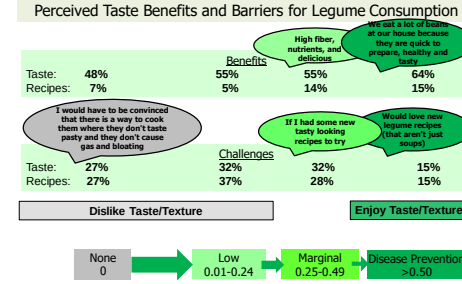
- The **top 3 barriers** for me to eat legumes are:
Dislike taste, Trouble digestion, Not Part of my culture, Diet limits legume intake, Take long time to prepare, Expensive, Difficult to find, Don't know how to cook, Don't know tasty recipes, Contain non-nutritious compounds and toxins, Allergic to legumes, No barriers, Others (please specify).

Perceived Health Benefits and Barriers for Legume Consumption



N=120

Perceived Taste Benefits and Barriers for Legume Consumption



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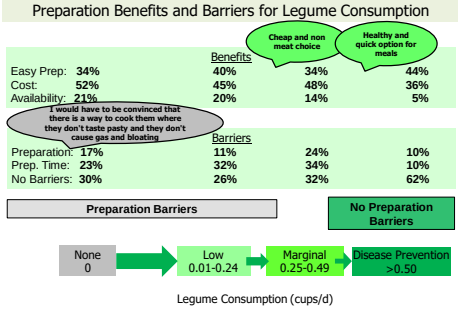
Preparation Benefits and Barriers for Legume Consumption



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Aim 4B: Consumer Perceptions

Can regular legume consumption prevent chronic diseases?	Don't Know
What are the reasons for the disconnect between dietary recommendations and legume consumption patterns?	Health Benefit Taste/Texture Preparation Recipes

Beans, Lentils and Peas Nutrition Education Survey (BLP)

Aim 4C: Identify preferences for legume promotion

Health Belief Model

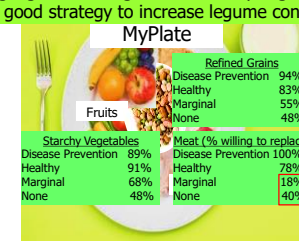
Preferences

What food groups below are you willing to replace with legumes? Please choose all that applies (starchy vegetables, refined grains, meat, other food group, none, I'm not sure)

Please share with us how you or someone you know was able to include more legumes into your/their regular diet? Also any tasty legume recipes you like to share

Substitution Preferences for Legume Consumption

Pairing legumes with grains or starchy vegetables may be a good strategy to increase legume consumption



Success Stories for Legume Consumption

I find the crock pot an essential tool for preparing recipes with beans and legumes for my family. This is a great way to overcome the inconvenience of cooking them

It's probably a good idea to let people know how quickly red lentils can be cooked

Canned black beans are inexpensive, handy, and kids like them melted with cheese on a while wheat tortilla. Love Italian style white beans as main with salad and crusty bread

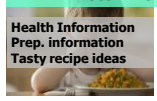
Aim 4C: Consumer Perceptions

Can regular legume consumption prevent chronic diseases?	Don't Know
What are the reasons for the disconnect between dietary recommendations and legume consumption patterns?	Health Benefit Taste/Texture Preparation Recipes
What are the consumer preferences for legumes?	Sweet Taste Creamy Texture Firm Texture Tasty Recipes Easy Prep Pairing

Summary
Legume Consumption Groups

Skeptics	Starters	Experienced
• Doesn't believe in health benefit of legumes • Concerned about legumes' high carbohydrate content • Dislike taste/texture • Have digestive health concerns • Unlikely to change	• Believe in health benefit of legumes • Have preparation challenges • Interested in more legume variety • Willing to change	• Believe in health benefit of legumes • Have no preparation challenges • Interested in recipes with more legume and dish type variety • Willing to change

Recommendations: Targeted Information



Conclusions

Can regular legume consumption prevent CRC?	Yes
Do U.S. adults consume legumes regularly?	No
Do BLP respondents consume legumes regularly?	No
Is there a disconnect between dietary recommendations and legume consumption ?	Yes

What needs to be done?

Conclusions
Legume Promotion – SMART Goals

Nutritional Concept

1 Raise DG for Legumes from 0.21 to 0.5 cups/d
(DG)
Vegetarian: **3 cups/wk** (75 g/d)

Nutritional Application

2 Display Legumes as Food Group on MyPlate

Culinary Application

3 Add legume types besides beans/peas in daily meals
meal
If present, legume types part of protein or vegetable food group

4 Pair legumes with grains/meats/vegetables
Dish/Recipe
Mostly bean/pea main/side dishes

Thank You

We eat beans plain just for snacks sometimes. Many soups are great with beans too. Hummus is a great replacement for mayo and salad dressing. Buddha bowls are super yummy with leftover beans or lentils & with hummus.

Thank You

Recipe Resources;
USA Pulse website: https://www.usapulses.org/
US Bean Council website: https://usdrybeans.com/
Michigan Bean website: https://michiganbean.com/recipes/
OSU Food Hero website: https://www.foodhero.org/recipes/healthy-recipes
Pulse Canada website: https://pulses.org/us/pulse-recipes/

Reference Resources:
Abdullah, M.; Marinangeli, C.P.F.; Jones, P.J.H.; Carlberg, J.G. Canadian potential healthcare and societal cost savings from consumption of pulses: a Cost-Of-Illness analysis. *Nutrients* **2017**, *9*, 793.
Darmadi-Blackberry, I.; Wahlqvist, M.L.; Kouris-Blazos, A.; Steen, B.; Lukito, W.; Horie, Y.; Horie, K. Legumes: The most important dietary predictor of survival in older people of different ethnicities. Asia Pac. J. Clin. Nutr. 2004, 13, 217–220.
Figueira, N.; Curtain, F.; Beck, E.; Grafenauer, S. Consumer understanding culinary use of legumes in Australia. Nutrients 2019, 11(7), 1575.
Kim, S.J.; de Souza, R.J.; Choo, V.L.; Ha, V.; Cozma, A.I.; Chiavaroli, L.; Mirrahimi, A.; Blanco Mejia, S.; Di Buono, M.; Bernstein, A.M.; et al. Effects of dietary pulse consumption on body weight: A systematic review and meta-analysis of randomized controlled trials. Am. J. Clin. Nutr. 2016, 103, 1213–1223.
Lea, E., Worsley, A., Crawford, D. Australian adult consumers' beliefs about plant foods: a qualitative study. Health Educ. Behav. 2005, 32(6), 795-808.
Marventano, S.; Izquierdo-Pulido, M.; Sánchez-González, C.; Grosso, G. Legume consumption and CVD risk: A systematic review and meta-analysis. Public Health Nutr. 2016, 20, 245–254.
Pereira, T.; Russo, C.; Takata, Y.; Bobe, G. Legume consumption patterns in US adults: National Health and Nutrition Examination Survey (NHANES) 2011–2014 and Beans, Lentils, Peas (BLP) 2017 Survey. Nutrients. 2020, 12(5). pii: E1237. doi: 10.3390/nu12051237.
Phillips, T.; Zello, G.A.; Chilibeck, P.D.; Vandenberg, A. Perceived benefits and barriers surrounding lentil consumption in families with young children. Can. J. Diet. Pract. Res. 2015, 76, 3–8.
Winham, D.M.; Hutchins, A.M.; Thompson, S.V.; Dougherty, M.K. Arizona registered dietitians show gaps in knowledge of bean health benefits. Nutrients. 2018, 10(1), 52.

Questions?

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MBC Bean Academy Summary

Delivering Benefits from the Bioactives in Plant-Based Foods

This webinar covered:

- The disease prevention benefits of regular legume consumption
- Current U.S. legume consumption patterns
- Consumer perceptions and barriers to regular legume consumption
- Approaches to promote regular legume consumption

MBC Bean Academy webinar details

- Continuing Education Credit certificate and the handouts are available at the Michigan Bean Commission website: https://michiganbean.com/health-professional-resources
- CEU: https://michiganbean.com/hp-webinar-bobe-ceu/
- A recording of today's webinar will be available to download at: https://michiganbean.com/health-professional-resources
- For questions: MBC.BeanAcademy@gmail.com

How are we doing?

- Stay on the line for a brief survey about this **MBC Bean Academy** webinar:

Thank you!