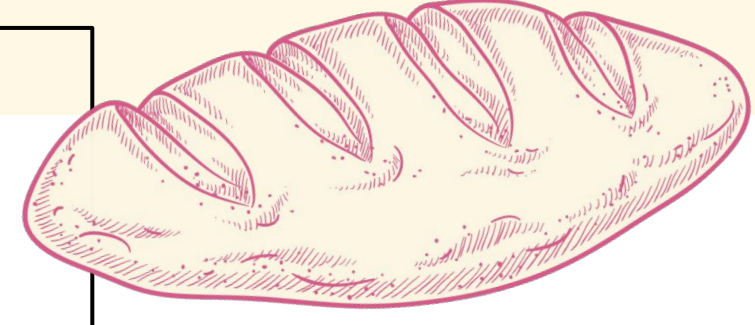


# Bread: A Slice of Life

## Abstract



This study explores the importance of gluten in traditional baking and addresses the growing demand for gluten-free options worldwide. It examines additives for dough stability, nutritional improvements, and enhanced sensory properties. Shifting to health, it analyzes how different grains affect the risk of type 2 diabetes, emphasizing the protective role of high whole grain intake. The study also explores reducing the glycemic index of bread through dietary fiber. Tracing bread's evolution from a staple to a functional food with disease-preventive properties, it discusses cultural significance. Finally, health-related aspects of bread in various religions and cultures, highlighting both its nutritional benefits and concerns like obesity and Celiac disease. The goal is to provide a comprehensive view of the diverse dimensions of bread.

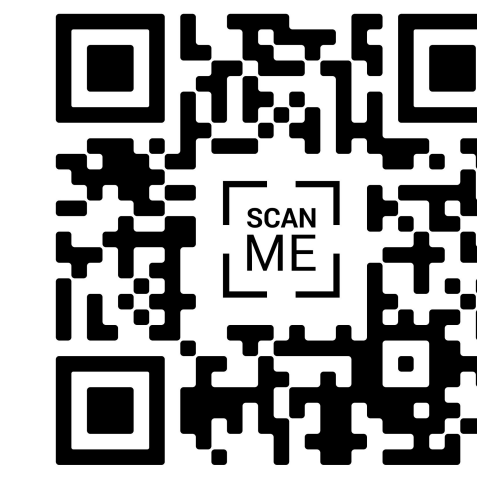


## Gluten Free Bread

- Gluten's viscoelastic gel structure, formed during kneading and water addition, is crucial for the unique properties of wheat dough and bakery products.
- Gluten Free bread uses other substitutes to make up for lack of gluten however the quality is gluten free bread can be unsatisfactory.
- Substituents such as hydrocolloids and even chia seeds improve the quality of bread by producing a gel that can immediate that of gluten

## Gluten Free Recipe

- 100 g (3/4 heaped cup) buckwheat flour (see notes)
- 100 g (2/3 cup) white rice flour
- 100 g (1 cup) chickpea flour
- 40 g (5 Tbsp) tapioca flour/starch (see notes)
- 1 tsp baking powder
- 1/2 tsp baking soda
- 3/4-1 tsp sea salt
- Psyllium mixture:
  - 450 ml (1.8 cup) water
  - 30 g (3 Tbsp) psyllium husk powder (gluten replacement)



## The Impact of Whole Grain Bread on Health Biomarkers

The rise of whole-grain bread as a healthier choice amidst the growing popularity of white bread prompts us to question its true health benefits...

Higher whole-grain bread consumption indeed linked to positive health outcomes:

- Lower GGT (gamma-glutamyltransferase) levels, indicating reduced oxidative stress.
- Lower ALT (alanine-aminotransferase) levels, suggesting improved liver function.
- Lower hs-CRP (C-reactive protein) levels, signaling reduced inflammation.

## History



- Dates back to 10,000 BC, seeds were main ingredients.
- Egyptians discovered sourdough bread back in 6000 BC.
- Ancient Greece there was a ritual bread known as "psadista".
- This ritual was designed to feed deceased individuals in the after life
- Romans created first ovens due to mass production of bread.
- Bread is a symbol of many religions.
- The Industrial Revolution led to the production of white flour through technological breakthroughs.

## Whole Grain Recipe



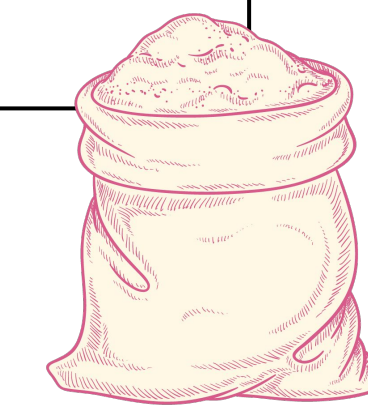
## Glycemic index

- The glycaemic index, a parameter that ranks carbohydrate-containing foods, is important to understand how bread quickly raises blood sugar and causes a higher insulin demand.
- Lower GI is more favorable to health, there are many ways proposed to lower it, specifically in the bread-making industry
- Possible strategies to lower glycemic index have been explored including adding soluble fibres, legumes refined grains and more
- Substituting whole grains for refined grains promote health benefits and reduce GI of bread

This table demonstrates the addition of different fibres in numerous studies and how they had effected glycaemic index, supporting the idea that fibres are satisfactory in decreasing this index.

Dietary fibre added	Amount	Period	Subjects	Effect on glycaemia or GI	Study
Arabinosylan (extracted from wheat bran)	7g/100g dw	Acute	Normoglycaemic	20% lower IAUC v. white bread	Lu et al. (2000) <sup>(50)</sup>
	14g/100g dw			41% lower IAUC v. white bread	
High-fibre barley genotype with high β-glucan content (Prowashonupana)	DF 25.2g/100g dw	Acute	Normoglycaemic	GI = 71 v. white bread (GI = 100)	Liljeberg et al. (1996) <sup>(56)</sup>
	DF 31.5g/100g dw			GI = 61 v. white bread (GI = 100)	
(1 → 3.1 → 4)-β-Glucan-enriched fraction (water extracted from sieved barley flour)	β-Glucan 5.75g/100g dw	Acute	Normoglycaemic	GI = 55 v. white bread (GI = 100)	Ostman et al. (2006) <sup>(61)</sup>
	β-Glucan 7.95g/100g dw			GI = 65 v. white bread (GI = 100)	
Guar gum	β-Glucan 12.24g/100g dw	Acute	Normoglycaemic	GI = 75 v. white bread (GI = 100)	Cavallero et al. (2002) <sup>(60)</sup>
	β-Glucan 6.3g/100g dw			GI = 72 v. white bread (GI = 100)	
Psyllium fibre	5g/100g dw	Acute	Normoglycaemic	41% lower blood glucose postprandial peak v. white bread	Wolever et al. (1979) <sup>(70)</sup>
	29.6g/100g dw			Lower IAUC v. white bread	
Xyloglucan (from <i>Detarium senegalense</i> Gmelin - African legume)	DF 10.4g/100g dw	Acute	Normoglycaemic	62% lower AUC v. white bread	Ornyechi et al. (1998) <sup>(68)</sup>
	Xyloglucan 5.5g/100g dw				
Buckwheat whole seeds	5g/50g available CHO	Acute	Normoglycaemic	GI = 47.5 v. white bread (GI = 66.8)	Jenkins et al. (2010) <sup>(75)</sup>
	5g/50g available CHO			GI = 37.3 v. white bread (GI = 66.8)	
PGX	7.5g/50g available CHO	Acute	Normoglycaemic	GI = 33.9 v. white bread (GI = 66.8)	Vuksan et al. (2010) <sup>(74)</sup>
	24g/50g available CHO			21% lower IAUC v. white bread	
Salba grain	15g/50g available CHO	Acute	Normoglycaemic	28% lower IAUC v. white bread	
	24g/50g available CHO			41% lower IAUC v. white bread	

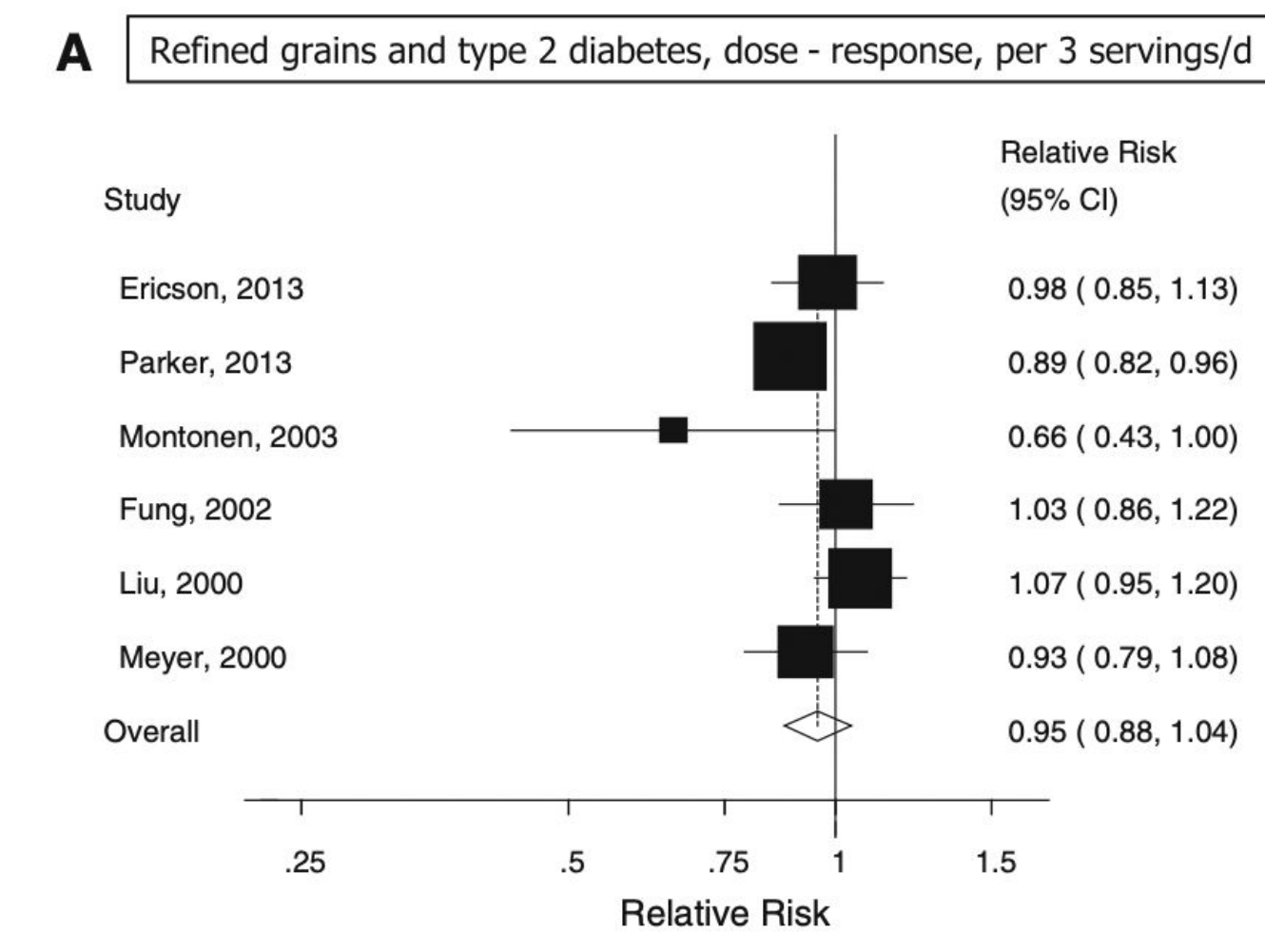
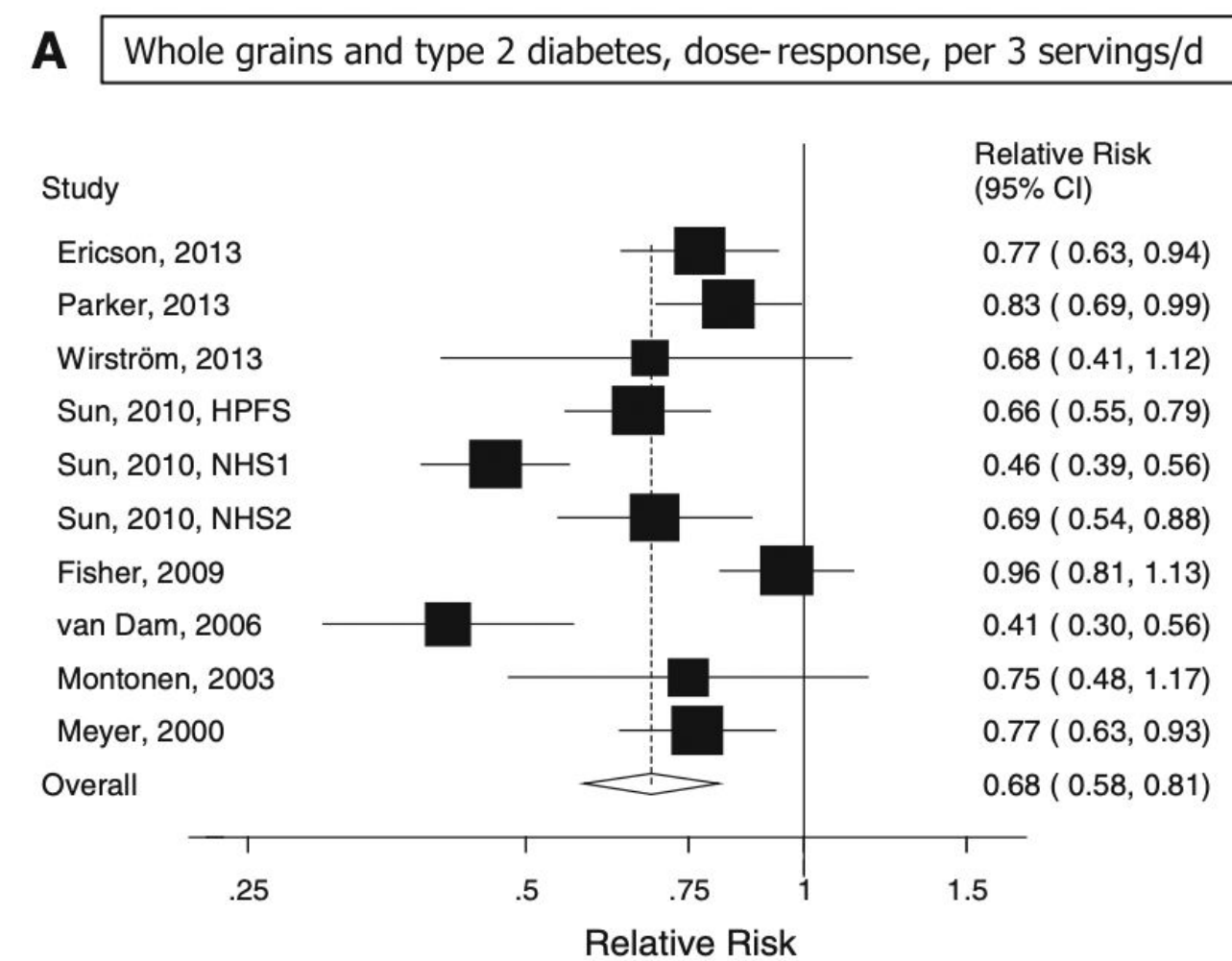
## True Price and Value



- Bread is a fundamental part of life nutritionally, historically, socially, and economically.
- Different grades of bread were used as status symbols
- Coarse black bread of the bronze-age was dense and darker due to the higher bran content and associated with the poor while whiter bread was associated with the wealthy
- Bread retains a cultural and religious significance Ex: Communion wafers
- Bread is rich in dietary fiber and resistant starch, which reaching the colon undigested, may contribute to reducing the risk of colon and rectal cancer in populations with high-fiber diets.
- Bread is a unique indicator of inflation pressure because it is at the base of the chain of commercial exchange
- In the first decade of Australian colonization (from 1788) flour was used as currency
- Bread Units" are an equivalent used to measure the sum of money something costs in comparison to the labor, price, and worker's time to bake a loaf of bread

## Linkage to Type 2 Diabetes

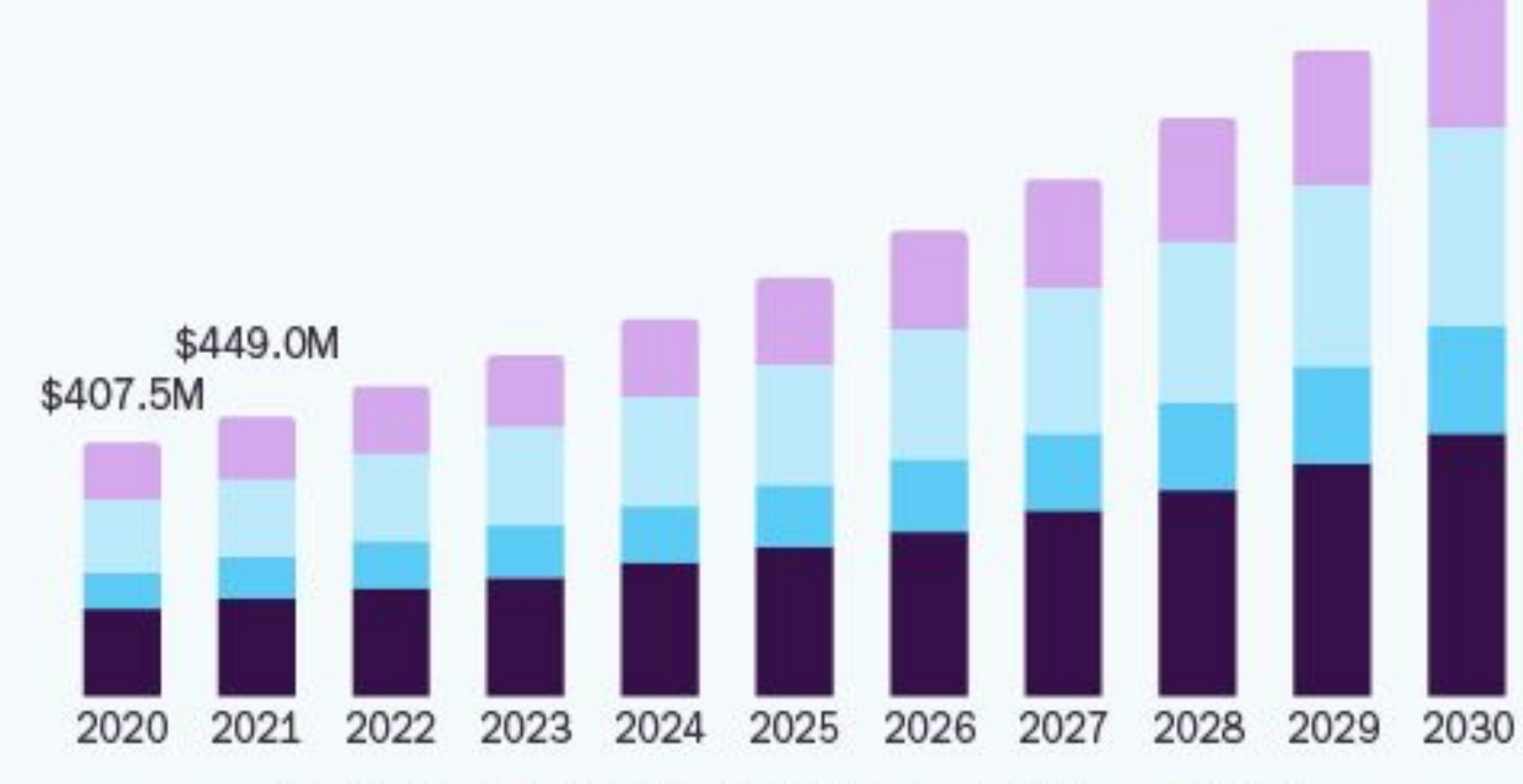
- The global prevalence of type 2 diabetes is a rising concern, projected to increase from 311 million in 2011 to an estimated 552 million by 2030, posing risks such as heart disease and cancer.
- It's known that whole grains may have a protective effect, but we must understand how much is enough. Research examining the connection between grain consumption and type 2 diabetes risk indicates that opting for whole grains over refined ones may reduce the likelihood of developing this health issue, emphasizing the significance of dietary choices in prevention.
- Sixteen cohort studies were and included in the analyses. The summary relative risk per 3 servings per day was 0.68 (95 % CI 0.58–0.81, I2 = 82 %, n = 10) for whole grains and 0.95 (95 % CI 0.88–1.04, I2 = 53 %, n = 6) for refined grains.



Relative risks (RR) of Type 2 diabetes throughout the 16 different cohort studies

## U.S. Gluten-free Bakery Market

size, by product, 2020 - 2030 (USD Million)



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This shows a 10% increase in the Compound Annual Growth Rate of a need for Gluten-Free Bread Products as projected by the year 2030