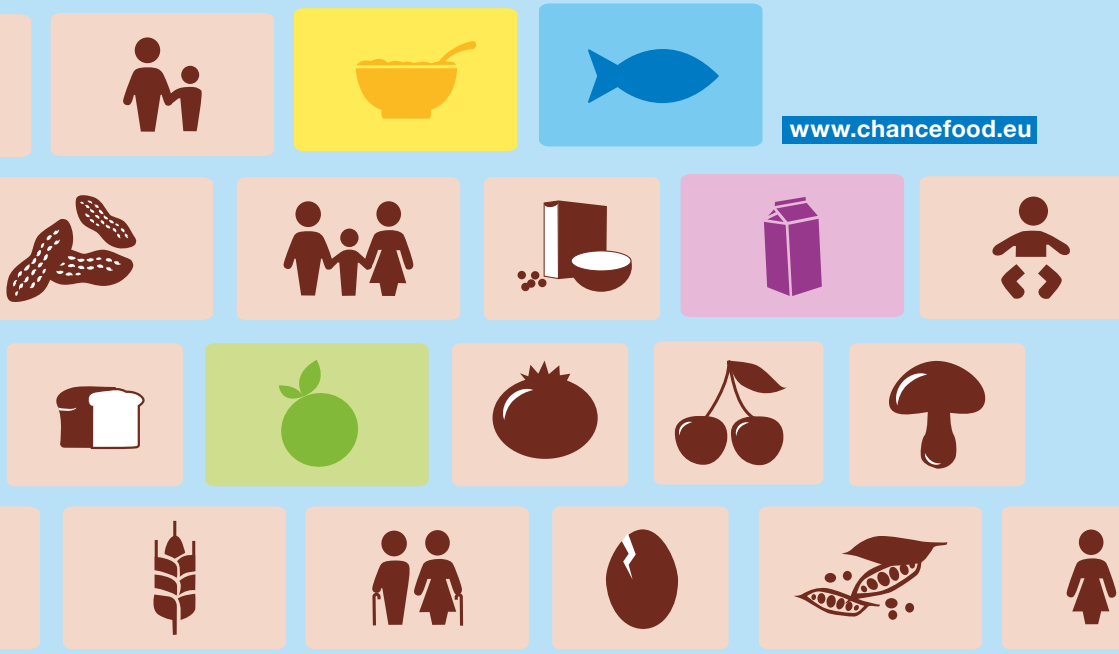
Chance

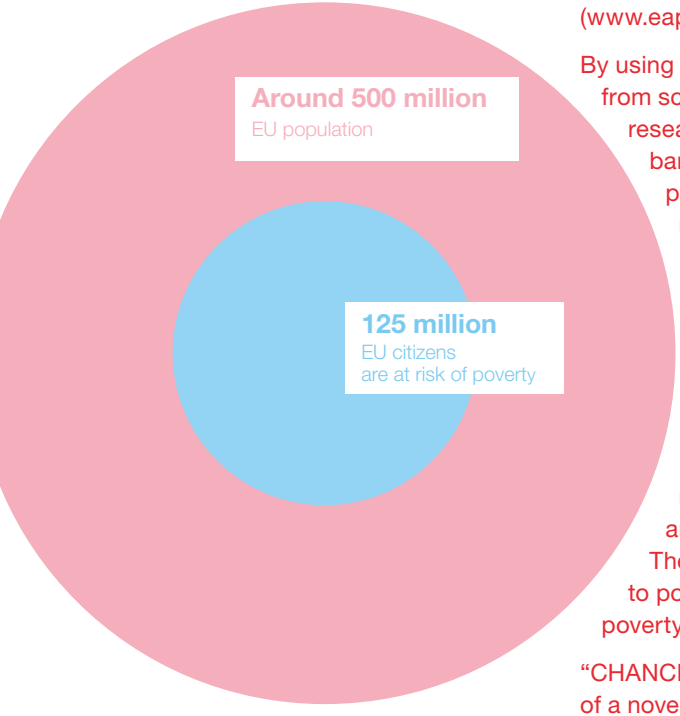
Targeting at risk-of-poverty populations in Europe with affordable and nutritionally enhanced food products

www.chancefood.eu



Across the EU, it is estimated that 125 million citizens faced poverty or social exclusion according to a 2012 report by the European Commission Directorate-General EUROSTAT.

A low disposal income has many detrimental effects on people's health and well-being, including poor nutrition. The three-and-a-half year CHANCE project, which received funding from the European Union's Seventh Framework Programme, aimed to develop low cost foods with an enhanced nutritional profile.



Source: European Commission Directorate-General EUROSTAT

The ingredients of traditional and frequently consumed foods were modified to increase the content of nutrients which were shown to be critical in the diets of low income population groups. At risk-of-poverty groups are defined as having less than 60% of the average income according to the EU-funded European Anti-Poverty Network. (www.eapn.eu)

By using multidisciplinary expertise from science and the food industry, researchers were able to identify the barriers which hinder at risk-of-poverty groups from purchasing nutritionally healthier foods. They also determined the main nutritional criticalities (over and under consumption of nutrients) in this group and in the normal population.

CHANCE researchers developed food prototypes – nutritionally enhanced, affordable and cheap to manufacture foods. They also made recommendations to policy makers to reach at risk-of-poverty population groups in Europe.

"CHANCE foods are successful examples of a novel strategy to overcome the nutritional inadequacies that are not only present in groups at risk of poverty but also in the general population. CHANCE's strategy could be further exploited by the food industry," said Francesco Capozzi and Alessandra Bordoni, joint coordinators of CHANCE.

Understanding the barriers towards healthy eating

To determine the barriers across the entire food supply chain which prevent the supply of nutritious food products, as well as the purchase of nutritious food, CHANCE's researchers conducted interviews with over 1,000 consumers, in addition to 53 face-to-face interviews with representatives from 32 small-and-medium sized enterprises (SMEs) and 21 retailers across five European countries. This provided insights into the challenges faced by both consumers and the food and drink industry.

Results showed:

- One of the main barriers towards the consumption of healthy foods was insufficient knowledge. This is applicable to industry and the public; both associate nutritious products with a high cost – to manufacture and purchase respectively.
- The food and drink industry view healthy food as a risky option – with a high capital cost and a risk of poor financial return.

A variety of recommendations emerged from this work which are applicable to consumers, retailers and the food and drink industry:

- The use of low cost, traditional ingredients may reduce the financial risk of manufacturing healthier products, which could include fresh or chilled ready-to-cook foods.
- Healthier, affordable food needs to be identified more readily; this could be achieved by developing a brand strategy or product identity for specified food products to guarantee easy recognition by consumers of the quality and safety of these foods.
- Lifelong education initiatives including cookery classes, advertising, recipe books and the provision of information about healthy eating provided by retailers could aid consumer awareness and motivation towards healthy eating.
- Across the EU there are a wide variety of barriers (often social and financial) which prevent improved nutritional health amongst different population groups. These differences need to be taken into account when setting up healthy eating initiatives.

Determining nutrient intake within the population

Current data in the literature suggests that low income groups' diets are less balanced than the average population. To investigate this further, the project's researchers identified dietary habits and nutritional criticalities. A Pan-European questionnaire which surveyed 1,290 people in five countries (Finland, Italy, Lithuania, Serbia and the UK) was used to compare the nutritional criticalities in risk-of-poverty groups with the average population.

Results of the interviews showed that:

- Fruit and vegetable consumption is lower in risk-of-poverty groups.
- People from lower income groups consume fewer sweets, cakes and biscuits, which may be attributed to the cost of these food products.
- In regards to nutrient intake, iron and fibre levels were particualrly low in low-income groups compared to the rest of the population.
- However, the population as a whole often failed to meet nutritional recommendations, regardless of income. This was especially applicable for fats and sodium, where intake was too high.

Based on these findings, CHANCE's researchers recommend that within the population as a whole, the total level of fat (particularly saturated fats), sugar and sodium levels need to decrease. Levels of vitamins, minerals and dietary fibre need to increase. The food prototypes developed by the CHANCE project could be used to address these issues.

How can we predict who is at risk of poverty?

To understand whether it is possible to use a biomarker (a measurable indicator of biological status) to forecast those who are at risk of poverty, In total, 2,372 urine samples were collected from the participants in Finland, Lithuania, Italy, Serbia and the UK. Participants were classified into two groups: Those at 'Risk of Poverty' (ROP) or those in the 'Affluent' group (AFF). Samples were analysed using a molecular analysis technique known as Nuclear Magnetic Resonance (NMR) to measure the type and concentration of different metabolites and determine if it was possible to predict which group they belonged to.

Results from the NMR dataset showed that:

- NMR analysis could not determine whether participants belonged to the AFF or the ROP group.
- Differences in income may not identify the differences in nutritional habits between the two groups.
- Differences between the groups' data samples may be explained by less subtle variations including age, gender and genetics.
- Data samples were particularly varied between countries, suggesting that cultural-dependent dietary habits and lifestyle are among the main sources of variation.

To extract more information from the data, researchers combined the Italian NMR dataset with nutritional information provided by the Italian participants, from food frequency questionnaires, about their eating habits.

Results from this combined data set showed that:

- Differences between the AFF and ROP groups were characterised by a difference in the fish products eaten.
- Fried chicken, turkey, fruit juices and mustard intake was higher in the ROP group; whereas in the AFF group, intake of white bread, fish, veal, rabbit, artichokes, cucumbers and broccoli were greater.
- This in-depth analysis could not predict which group any given sample belonged to; however, samples belonging to females in the ROP group showed far more variation in their metabolic profiles.

In the future CHANCE researchers recommend that EU governments should consider applying NMR screening, providing suitable biomarkers, to validate this technique as a way of assessing the nutritional health of the population in a country.

Developing new, nutritious food products

To develop traditional, nutritionally enhanced food products CHANCE researchers applied innovative manufacturing techniques in their food processing. This resulted in several commonly consumed food prototypes that were indistinguishable in taste from equivalent brand-leading products on the market.

The food prototypes developed were:

CHANCE ham

A CHANCE ham which contains lower salt content, up to 7% pork liver and higher levels of vitamins A, D and E than found in commercial ham.

CHANCE ketchup

Seeds and skin from the by-processing of tomatoes were used to produce the CHANCE ketchup. The ketchup contains up to ten times the amount of dietary fibre compared to readily available ketchup.

CHANCE mozzarella-like cheese

A new microfiltration technology was used to extract casein from skimmed milk to make a mozzarella-like cheese. The fat and carbohydrate content was reduced and the amount of vitamin B12 was doubled in comparison to traditional mozzarella cheese.

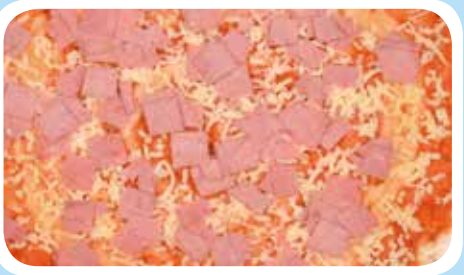
Casein

CHANCE pizza

Dough containing a soybean additive, in addition to the ham, ketchup and mozzarella-like cheese was used to manufacture the CHANCE pizza.

CHANCE blueberry-based products

A blueberry based yoghurt, soup and smoothie containing berries and vegetables were developed. A new wet-milling process resulted in a greater level of fibre extraction from the blueberries.



CHANCE Bread

A traditional staple given a new formulation:

Bread is an important staple food. CHANCE researchers developed bread which contained combinations of important macro and micro nutrients.

CHANCE bread

Various recipes of ingredients were used to produce different varieties of the CHANCE bread:

10% more bio-processed bran.

Up to 100% of a special type of flour which has a very high protein and dietary fibre content.

Up to 50% more of a soybean additive, which increases the bread's fibre and vitamin content, is gluten-free and low in carbohydrates.

CHANCE's researchers also developed alternative materials and methods for packaging, designed to reduce overall costs further. These included paper pouches for bread and thinner or semi-rigid plastics for packaging the CHANCE pizza.
The materials used are cheaper than what is currently used and recyclable. To reduce the overall price of the blueberry soup, low-cost metal cans were developed as a substitute to plastic.

If the CHANCE food prototypes were developed for the marketplace, they could potentially bear claims according to the nutritional content which has been achieved using the selected ingredients and manufacturing techniques.

Bio-processed bran

Soybean additive

Could CHANCE products be economically successful on the market?

Part of the work of the project involved analysing the production costs of the CHANCE foods developed and comparing them against similar on-the-shelf products in order to examine the economic feasibility of selling the CHANCE products on the market.

Results:

- The preliminary production costs are similar or lower for all CHANCE foods compared to corresponding traditional products; however, these estimates are uncertain as the total estimates will depend on additional factors, including supply chain coverage and sources of energy. Therefore, further assessments are needed.

CHANCE researchers recommend that case study evaluations be undertaken to decrease the uncertainties about how CHANCE products would fare on the market.

CHANCE products
from production to industry

The final part of the work conducted by CHANCE researchers involved determining the feasibility of producing CHANCE food prototypes on a large scale. The food prototypes developed were not only assessed for their nutritional qualities but also for factors such as shelf life and against similar products that exist on shelves.

The findings for the CHANCE ham and bread were as follows:

- To manufacture the CHANCE ham, researchers used the maximum level of pork liver without adversely affecting its sensory properties (taste, smell, feel and appearance); additionally, the quality and safety level of the products was similar to commercially sold ham. This makes it a viable product for the market place.

- For the bread products, the shelf life of different prototypes was variable and depended on the additive used. However, the sensory properties of the bread prototypes were not significantly altered in comparison to on-the-shelf bread. This makes the bread products a viable nutritionally enhanced product for the marketplace. In order to improve the bread prototypes further, the researchers recommend that further research is conducted to determine the best temperature to bake each bread product.

In order to ensure commercial success, correct labelling, marketing and advertising would need to be implemented too in order to attract retailers and consumers.

CHANCE partners

CHANCE is a multidisciplinary team of universities, research institutes, small-and-medium sized enterprises (SMEs) from the food and drink sector as well as two European non-profit organisations in the fields of communication and standardisation.

Budapest University of Technology and Economics, BME, Hungary
Consorzio Interuniversitario Risonanze Magnetiche di Metalloproteine Paramagnetiche, CIRMMP, Italy
European Committee for Standardization, CEN, Belgium
European Food Information Council, EUFIC, Belgium
Institute for Food Technology in Novi Sad, FINS, Serbia
Institute for Medical Research, IMR, Serbia
Institute of Food Research, IFR, United Kingdom
Italian Organization for Standardization, UNI, Italy
Proteus Gold KFT, LIPOTI, Hungary
STRAND d.o.o., Serbia
Technical Research Centre of Finland, VTT, Finland
UAB Lietpak, LP, Lithuania
University of Bologna, UNIBO, Italy
University of Copenhagen, Denmark
University of Manchester, UK
Valio Ltd, Finland
Vilnius University, VU, Lithuania
Zdravo Organic d.o.o., Serbia

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www.chancefood.eu

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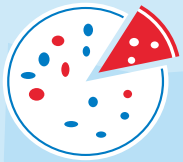
CHANCE
ketchup

CHANCE
mozzarella-like cheese

CHANCE
ham

CHANCE
bread



CHANCE
pizza

CHANCE
blueberry-based products