

# **MASTER THESIS**

Food, Nutrition and Health

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## **The development and evaluation of a bread baking intervention**



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# Acknowledgements

This report is the final product of my master degree in public health nutrition. Working with the master thesis has been inspiring and enjoyable, but also challenging and a great deal of work. A wish of doing some practical work in relation to the master thesis made the bread baking intervention a suitable choice. In the work with this project I have been able to use my knowledge through different paths, like course development and implementation, baking, recruitment and evaluation. Through these different tasks I have gained valuable knowledge, which will be useful in future projects and tasks.

I would like to thank my supervisor, Elling Bere for inspiration and guidance through the process, and a big thanks to Kjersti Lilleberg for a good partnership and collaboration.

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# Summary

## **Introduction**

Bread is part of the Norwegian food culture, and a large part of our daily diet. However, the intake of fibre and hole grains is to low, and the Norwegian government encourages an increase in the intake of wholemeal bread and cereals. In addition, only half of the Norwegian population reaches the recommendation of being physical active for at least 30 minutes a day.

This thesis describes the development and evaluation of a bread baking intervention. The interventions aim was to develop and test the feasibility of a intervention aiming at getting people engaged in baking bread and as a consequence possibly reduce and substitute sedentary behaviour.

## **Methods**

The tools *Intervention Mapping* and *Rothschild's framework* was used in the development of the intervention. Both, makes the intervention theory and evidence based, and therefore more likely in reaching its goals.

The intervention consisted of a baking course that lasted over two nights. The course taught the participants how to bake bread (with a recipe especially developed for the course), and they were introduced to the benefits connected to home baked bread through a lecture. The study sample consisted of 51 participants, mainly women, with higher education.

The intervention was evaluated through three questionnaires. The questionnaires included among other, questions about baking habits, type of bread eaten and TV/DVD/PC habits. These were disturbed to the participants, at baseline, two weeks after the course and between to and three months after the course.

## **Results**

The statistical analysis showed that the intervention increased the baking frequency among the participants. In addition, the coarseness of the bread eaten, and percentage

that ate home baked bread increased. Moreover, the skills and knowledge among the sample improved after the intervention. A reduction in TV-time was observed, however these changes was not statistical significant.

### **Conclusion**

The intervention proved to be effective in increasing the baking frequency among the participants. Future research ought to assess the potential health implications of bread baking.

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## List of abbreviations

SIFO:	Statens Institutt for Forbrukerforskning
SCT:	Social Cognitive Theory
RCT:	Randomized controlled trial
WHO:	World Health Organization
NOK:	Norwegian kroner
HIOA:	Oslo and Akershus University College
NSD:	Norsk samfunnsvitenskaplig Datatjeneste
BMI:	Body mass Index

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# 1.0 Introduction

Bread is embedded in the Norwegian food culture and therefore a large part of our daily diet. Despite frequent media debates about the health benefits of low carb and low glycaemic diets the past decade, the Norwegian consumption of grain has not decreased, but instead significantly increased in the same period (Bugge, Lavik & Lillebø, 2008; Helsedirektoratet, 2011a). The consumption of wholemeal flour however, has not changed much, and contributes approximately only 20 per cent of the total meal turnover. The intake of fibre is significantly lower than the recommendation of 25-35 g fibre a day. This is the trend despite an increase in the intake of fibre during the period from 1977-2008 (Helsedirektoratet, 2011a). Therefore, the Norwegian government, through their official dietary advice, urges an increased consumption of wholemeal bread and cereal products (Helsedirektoratet, 2011b). According to a report from Statens Institutt for Forbruksforskning (SIFO) (Bugge et al., 2008), half the Norwegian population buy their bread in grocery stores. While baking bread from scratch is a downward trend, more people use readymade bread mixes (Bugge et al., 2008). Industrial produced bread often contains large amounts of salt, additives and e-agents (Nilsson, 2007; Monterio, 2010). Furthermore, healthy wholegrain bread is often expensive and frequently has a poor shelf life.

Despite more spare time only half of the Norwegian population reaches the governments recommendation of being physical activity for at least 30 minutes a day (Folkehelseinstituttet, 2011). In line with other populations around the world the Norwegian one is affected by increased levels of lifestyle related diseases like diabetes, overweight and cardiovascular disease (Helsedirektoratet, 2011b). The Norwegian population is also alike to other populations around the world getting heavier. The proportion of the population who has a weight problem is increasing. However, lifestyle related diseases, like overweight are to a large extent preventable through healthy diet and physical activity (Helsedirektoratet, 2011b).

Most studies that look at the effects of physical activity on health measure leisure-time physical activity. However, many people get physical activity from non-leisure

activities like activity at work and household chores. Household chores, e.g. baking bread can be good every day activity (Arrieta & Russell, 2008). I.e. bread baking therefore has the potential of affecting people's activity level. In addition, according to a study conducted among a representative sample of the adult segment of the U.S. population, non-leisure time physical activity was connected to a reduction in all-cause mortality (Arrieta & Russell, 2008). Moreover, spending time baking bread may also reduce the time people spend on sedentary activities like watching TV. To bake your own bread will in addition provide you with healthier bread, with more whole-grain and less energy and salt than commercial produced bread. Since the Norwegian population eat a lot of bread, switching to a healthier alternative can be of importance.

However, changing dietary habits and behaviours or introducing new ones is not an easy task (Weber Cullen, Bartholomew, Parcel & Kok, 1998). There are a lot of factors influencing on peoples choices and habits (U.S Department of Health and Human Services, 2005). In order to affect and change people's choices and habits it is not enough to have knowledge about witch behaviours that lead to disease. You need to have knowledge about the factors that are influencing the behaviours that lead to disease (Schavio, 2007), and be able to use this knowledge in the work of developing different health promoting and preventive programs (Schavio, 2007). These influencing factors are referred to as determinants.

This thesis includes a description and discussion of the process of developing a bread baking intervention, as well as a poster and article focusing on a process and outcome evaluation of the present intervention.

## ***1.1 Aims and hypotheses***

This master thesis is part of the project, "A Bread Baking Intervention". The project has 4 study objectives. Develop a recipe for an "ideal" bread (1), develop an intervention aiming at getting people to bake this bread instead of watching TV (2),

conduct a pilot implementation study of the intervention, (3) and assess a process and outcome evaluation of the pilot implementation (4).

Based on the 4 study objectives two master theses were written. The present thesis focused on study objectives 2, while master student Kjersti Lilleberg addressed objective 1. Study objectives 3 and 4 resulted in a common article and poster (see attachments). Both have contributed equal to the practical tasks of the intervention (i.e. in relation to all four objectives).

## 2.0 Theory

### *2.1 Benefits of baking your own bread*

#### **2.1.1 Health benefits**

There are several good reasons for engaging in bread baking (see Table 2), many of them are connected to health. Cereals, with its high content of starch, are an important energy source for people in many countries. In addition to its high content of carbohydrates, cereals also contain other substances that have the potential of being beneficial with respect to health. Whole grains are rich in B-vitamins (Dewettinck et al., 2008). B-vitamins are important in several processes in the body. They are essential in the process of utilizing carbohydrates and in the metabolism of fatty acids, glucose and amino acids. In addition, B-vitamins have other important functions in light of being part of important enzymes (Nordic Councils of Ministers, 2004). Cereals also contain healthy lipids, like essential fatty acids. The intake of these can reduce the absorption of cholesterol. High cholesterol is a well-known risk factor for cardio vascular disease (Helsedirektoratet, 2011). Minerals are also present in cereals. Barley, rye, oats and wheat contain moderate amounts of iron, magnesium, calcium, copper and zinc (Dewettinck et al., 2008). On the other hand, grains also have a shortage of nutrients that are essential for humans and many of the minerals and vitamins present are of low biological availability (Cordain, 1999).

However, the baking process can influence the biological availability of nutrients. Phytic acid is a substance that is formed during the maturation of plant seeds, and is therefore a common substance in for example cereals. Phytic acid affects the bioavailability of nutrients (Kumar, Sinha, Makkar & Becker, 2009; Dewettinck et al., 2008). To have a prolonged elevation time can however reduce the formation of phytic acid in the dough, and as a consequence have the potential of improving the uptake of nutrients (Kumar, Sinha, Makkar & Becker, 2009; Dewettinck et al., 2008).

Grains are the greatest source of dietary fibre in the Norwegian population (Helsedirektoratet, 2011a). Whole grains contain a lot of fibre. Intake of fibre has been known to have a likely protective effect in relation to colon and rectal cancer and cardio vascular disease (Helsedirektoratet, 2011b; Kendall, Esfahani & Jenkins, 2009). Moreover, a high intake of fibre can help in the process of maintaining a healthy body weight. Studies undertaken have shown an association between fibre intake and body weight. Subject having a diet high in fibre was more likely to also have a normal weight (Appelbye, Thoogood, Man & Key, 1998).

Commercial produced bread contains a lot of salt, and is one of the main sources of salt in the Norwegian diet (Helsedirektoratet, 2011b). Thus, baking bread yourself can have the potential of significantly reducing your salt intake. There is a convincing association between the intake of salt and high blood pressure. Moreover, there are also convincing documentation that a high intake of salt increases the risk of developing cardio vascular diseases and cancer (Helsedirektoratet, 2011b).

Every day activity is an important contribution in an every day which consists for a great deal of people of increased amounts of sedentary behaviour. The bread recipe developed and used in the project was based on long-term elevation. This involved that the dough was elevated in the refrigerator for up to 24 hours and baked the next day. For most people making the dough at the evening is therefore most relevant. This is a time many use on watching TV. By engaging them in bread baking instead may reduce the time spent on viewing TV. A study that examined the effects of a reduction in TV time showed that the participants who reduced their TV time increased their energy expenditure (Otten, Jones, Littenberg & Harvey-Berino, 2009). In light of this a reduction in TV watching can be a contributing factor in the work of reducing and

preventing obesity. Other studies have also shown that sedentary activities, like TV watching are associated with a less healthy diet among children, adolescents and adults. The less healthy diet was represented by lower consumption of fruit and vegetables and a higher intake of snacks high in fat and sugar (Pearson & Biddle, 2011). Time spent on sedentary behaviour has also been associated with increased risk of all cause mortality and obesity (Thorp, Owen, Neuhaus & Dunstan, 2011).

## **2.1.2 Environmental benefits**

There are also environmental benefits connected to baking bread. Globally, food industrialization is one of the most polluting activities. Greenhouse gases are emitted during different stages of food production, e.g. in the agriculture sector, by the use of fertilizers and during transportation (Carlsson-Kanyama, 2005). The emissions related to the food sector causes loss of biodiversity, depletion of soil and pollution of water, soil and air (Nymoene, Bere, Haugen & Meltzer, 2009). Despite the fact that meat production is the main contributor in this respect, bread production and consumption holds great potential to become more sustainable. If people bake their own bread the gap between producer and consumer will be removed, and pollution connected to transportation will be reduced. In addition, baking bread gives individuals the opportunity to choose local produced grains. Rye, barley and oats are examples of traditionally Norwegian grains, which are cultivated and thrive in the Nordic climate (Bere & Brug, 2008). By the power of being a consumer we have the opportunity to make more environmentally choices when we decide what to buy and consume.

## **2.1.3 Economic benefits**

Choosing to bake your own bread can significantly reduce the money spent on bread. To purchase a healthy whole grain bread is expensive. But baking it yourself will only charge you a third of the price (see Table 1). Even though this might seem like small amounts, viewed over an entire year there is much money to save.

**Table 1.0 Calculations of the charges connected to home baked bread and bread bought in grocery stores.**

<b>Home baked bread*</b>		<b>Bread bought in grocery stores**</b>	
Flour:	6.4 NOK***	Barley bread:	31 NOK
Oatmeal:	2.0 NOK	Oat bread:	29 NOK
Yeast:	0.25 NOK	Spelt bread:	28 NOK
Flaxseed:	2.0 NOK	“Vita Hjertego” bread:	33 NOK
Electricity:	1.5 NOK		
<b>SUM:</b>	<b>12.5 NOK</b>	<b>AVREAGE COSTS:</b>	<b>30.5 NOK</b>

\* **Recipe in the current project**

\*\* **The prices are collected at the grocery store Kiwi in April 2012.**

\*\*\* **Norwegian kroner**

Table 1.0 compares the cost connected to home baked bread and bread bought in grocery stores. The calculation put down for the home baked bread is based on the ingredients in the recipe connected to the bread baking intervention. Thus, the costs associated with homemade bread will vary depending on the recipe used. Included in the calculation is also the cost of electricity, linked to the use of oven while baking the bread. The different breads put up in the calculation of bread purchased in grocery stores, are bread that are similar to the homemade bread, with respect to coarseness and healthiness.

If a family of four consume four healthy whole grain breads a week, and this bread is bought in grocery stores, this will cost the family 5760 NOK a year. If the family had baked the bread themselves the costs would have been 2400 NOK. By only engaging in bread baking a family of four potentially could save an amount of 3300 NOK each year.

*Table 2.0. Benefits associated with homemade bread*

<b>BENEFITS ASSOCIATED WITH HOMEMADE BREAD</b>	
<b>Avoiding food additives and salt from industrial bread</b>	Industrial bread is one of the main sources of salt and additives in the Norwegian diet. By baking bread yourself you can control the breads content.
<b>Everyday activity</b>	A substantial part of the Norwegian population does not comply with the official recommendations for physical activity. Everyday activity like bread baking can be an important contribution in a generally sedentary lifestyle, e.g. by substituting sedentary activities like TV-watching.
<b>Economy</b>	Healthy breads are relatively expensive, but baking them yourself is cheap. A healthy bread (whole grain bread) has an average cost of 30 NOK while a homemade only cost 12.5 NOK.
<b>Environmental considerations</b>	The food industry is an energy-demanding sector, thus making more food from scratch, will benefit the environment. With respect to bread baking, both ecologically and Norwegians grains (e.g. rye, barley and oat) can be included in the recipe.

In table 2.0 the benefits connected to homemade bread are summarized. To bake your own bread will under the right circumstances have multiple health benefits. The bread tastes good and can be healthy, further; the baking can be good every day activity and may reduce the intake of salt and additives. Furthermore, baking homemade bread might also benefit the environment and your economy.

## **2.1.4 The industrial produced bread**

In stores today there exists a large selection of different breads. Many one of them is trying to make the consumer feel that the bread they end up buying is natural, healthy and fresh. However, this is not always true. This has its explanation in for example time, consumer's expectations and economical reasons. Since time is money, the industry wants to use as little time as possible on producing the bread, but want the breads durability to be as long as achievable (Nilsson, 2007). To speed up the baking processes the industry makes use of large amounts of yeast and different chemical oxidants. And in order to make the fermentation time shorter, and as a consequence save time, the industry add extra air and water to the dough (Nilsson, 2007). However, a long fermentation time is favourable based on several reasons. Long fermentation time increases the content of B-vitamin, because B-vitamin is

synthesised during fermentation, and studies have showed that a long fermentation time kept more of thiamine in the dough (Batifoulier, Verny, Chanliaud, Rémésy & Demigné, 2005). Additionally, as discussed earlier a long fermentation time is also favourable in the respect that it reduces the content of phytic acid in the bread. A high content of phytic acid may result in a reduced uptake of nutrients from the bread (Dewettinck et al., 2008; Kumar et al., 2009). Moreover, the formation of lactic acid bacteria is larger when the dough has had a long fermentation time. A higher concentration of lactic acid can also improve the uptake of nutrients (Dewettinck et al., 2008; Mayer, 2009). Also, industrial produced bread is one of the main sources of salt in the Norwegian diet (Helsedirektoratet, 2011b).

Industrial produced bread also contains a lot of additives (Nilsson, 2007; Monterio, 2010). The Norwegian government has strict regulations connected to the authorization of food additives (Forskrift om tilsetningsstoffer, næringsmidler, 2011), and the additives used in food are carefully tested. And the ones that are used are considered safe by the authorities. However, the experimental trials that are done and forms the evidence base used in the process of getting authorization of additives are conducted on experimental mice (Nilsson, 2007). The lifespan of an experimental mice is much shorter compared to a humans lifespan, thus the exposure to different substances like food additives will be different. With this awareness in mind perhaps the knowledge concerning food additives are deficient. Nilsson question the used of food additives in his book “Den Hemmelige kokken. Noen har jukset med maten din” (Nilsson, 2007).

## ***2.2 Behaviour change theories***

Repeated causes of death in Norway and globally are connected to chronic diseases like diabetes, cancer, cardio vascular disease and lung disease (Helsedirektoratet, 2011; World Health Organization, 2003). The conditions behind are complex, but chronic diseases are often connected to behavioural factors. The most prominent behaviour factors in this respect are diet, smoking and physical activity patterns (Helsedirektoratet, 2011b). In light of this, the Norwegian government has been placing more and more focus on prevention and lifestyle changes. Through the white

paper “Samhandlingsreformen,” (St.meld.nr 47 (2008-2009), 2009), the Norwegian government focus on preventing disease rather than treating it. This prevention focus is for example illustrated by trying to give the ones who wishes and needs to change their lifestyle (e.g. changing diet, quit smoking and start engaging in physical activity) better services and follow-up in their local community (St.meld.nr 47 (2008-2009), 2009). In addition, the government has been putting effort into making it easier for the population to make healthier choices when making their purchases in grocery stores. The label “Nøkkelhullet” is part of a labelling scheme witch are intended to guide the consumer to hopefully healthier choices (Forskrift om frivillig merking med Nøkkelhullet 2009).

A health promotion program is much more likely to be successful when the determinants of the health problem and the motivation and needs of the target population is well understood. The program needs to be tailored to the relevant target group (Nutbeam, Harris & Wise, 2010). Theory can be a much-needed tool in this respect. There are many theories existing that try to explain how behaviour change occurs (U.S Department of Health and Human Services, 2005). Common to all behaviour change theories are that they use one or more sets of explanatory factors when they address different behaviours. This can for example be personal factors, behaviour factors, environmental factors and social factors (Nutbeam et al., 2010). Most of the theories come from social and behavioural science and have elements from fields like sociology, psychology, marketing and politics. This emphasizes the diversity of health promotion work (Nutbeam et al., 2010).

*Social Cognitive Theory* (SCT) is a theory witch commonly has been used in health promoting work when trying to affect health behaviour. The theory consists of many concepts, and these can be categorised in five categories. These are: observation learning, self-regulation, moral disengagement and psychological and environmental determinants of behaviour. As it appears from these categories, SCT combines both individual and environmental factors in the process of explaining health behaviour (Glanz, Rimer & Viswanath, 2008). The theory emphasizes the importance of the interaction between these different factors, they do not work in a vacuum, but have a reciprocal influence on each other (Bandura, 1986).

However, most health promotion theories are not highly developed and tested, and therefore it is better to look at them as models or frameworks (U.S Department of health and human services, 2005). However, in order to get interventions evidence based, the use of theories is the only foothold that exists.

Since behaviour cannot be influenced directly we need to influence peoples choices witch leads to different behaviours. People's choices is predicted and influenced by a great deal of factors. These affecting factors are referred to as determinants. In order to change behaviour itself, we have to change the determinants of the behaviour (e.g. knowledge, skills and motivation). According to Brug (2008) nutritional advice and information alone is not enough to get people adopting a healthier diet. This indicates that knowledge is an inadequate determinant in this respect. Instead it has been claimed that the environment we live in to a large extent influence our eating habits. In line with health communication theories, like *Theory of Planned Behaviour*, *Protection Motivation Theory* and *Social Cognitive Theory*, four groups of factors influence health behaviour; attitudes, self-identity, self-efficacy and social influence.

By inspiration from the three theories mention above Rothschild introduces a framework of factors in relation to behaviour change. This framework, like SCT, combines both individual factors and environmentally factors in explaining behaviour change. According to Rothschild, motivation, ability and opportunity are important groups of determinants influencing behaviour change (Rothschild, 1999).

### **2.2.1 Rothschild's framework of determinants affecting health behaviour change**

In this intervention *Rothschild's framework* was used as a theoretical base. In his framework elements from central behaviour change theories are combined and represented by three groups of determinants (motivation, ability and opportunity) that affect behaviour change (Rothschild, 1999). These three determinants of behaviour change as described by Brug (2008) will now to be further elaborated.

*Motivation* is affected by attitudes and self-identity. Attitudes are rooted in expected outcomes of the existing health behaviour. These outcomes can be of positive and negative character. Short-term outcomes are more likely to affect health behaviour than long-term outcomes. Pleasure, taste and satiety are important short-term outcomes for the majority of people (Brug, 2008). On the contrary future health is an outcome that to a small extent effect peoples food choices. Further, thoughts and characteristics about him or herself (self-identity) can affect a person's health choices. For example, if a person think of himself as animal friendly it is easier for that person to be motivated to adopting a vegetarian diet (Brug, 2008).

*Ability* is associated with characteristics like self-efficacy, witch is a persons confidence in his or hers ability to adapt to a specific behaviour. If an individual's confidence in e.g. eating more vegetables is good, it is more likely that this will follow through. Self-efficacy is a central part of *The Health Believe Model and Social Cognitive Theory* and together with concepts like perceived benefits and perceived seriousness it tries to explain health behaviour change (Nutbeam et al., 2010). A self-efficacious person feel more confident about performing different behaviours and may be more likely of putting their plans into action (Richert el al., 2010). Knowledge will also affect a person's ability to engage in different behaviour (Brug, 2008). To have some practical knowledge about what healthy food is, will help in the process of switching to a healthier diet. However, knowledge alone is often considered necessary, but not enough to get people adapting to a healthier diet (Brug, 2008).

*Opportunity* is related to the environment that surrounds us (Brug, 2008). The environment is apparent at both a macro- and a micro level. Macro-environments are parts of the environments witch is further apart from us, like marketing of foods and tax systems, however they are still in the position of affecting our food choices (Brug, 2008). The microenvironment is more close to people and consists of places where people gather at a regular basis, and where there is place for mutual exposure between environment and the individuals. Places like this include, school, workplace, super markets and place of living. School for example can operate as an important health promotion arena, because children and youth spend a great deal of time here (Patton, Lyndal Bond, Butler & Glover, 2003). There are in these settings, both at the macro and micro level, opportunity to influence health behaviour (Brug, 2008). If there is

lack of opportunity to perform certain behaviours it means that there are no mechanisms in the environment to support the behaviour (Rothschild, 1999). If for example a family wants to eat ecological food but there is no stores in their neighbourhood that offers it, or if you want to bake your own bread, but don't find time for it.

Therefore, to encourage healthy eating behaviours (e.g. baking your own bread), people should be self-confident about their abilities, be motivated, and be exposed to surroundings that offer them easy opportunities (Brug, 2008).

## ***2.3 Developing interventions/nutrition promotion***

Nutrition is an important influencing factor in relation to good health (World Health Organization, 2003). In this respect effort is made towards influencing the population's diet in a healthier direction. Nutrition promotion is activities put out with the intention of making a population's nutrition status healthier (Worsley, 2007). This can be done through different paths. By influencing important actors in the food industry, like distributors, politicians, manufactures and farmers, and by trying to influence and motivate individuals (Worsley, 2007). Thus, nutrition promotion can be practiced through the use of interventions.

To develop a successful intervention is a challenging task. There exist a lot of guides to use in the work of developing health promotion programs, e.g. the intervention mapping procedure (Schiavo, 2007; Bartholomew et al., 2011). These guides intend to help in the planning, implementation and evaluation process of the program. They all focus on good planning and preparations in order to achieve a successful health promotion program. In the book "Health communication- from theory to practice", Renata Schiavo describes how health communication should be delivered. The book presents health communication projects as a cycle with three main steps: planning, implementation and monitoring (Schavio, 2007). The guide focuses on the importance of knowing the target group well and during the process monitor and obtain feedback in connection to the project (Schavio, 2007). *Project Cycle Management* is another

guide to use in the planning and managing of health promoting projects (Blackman, 2003). This tool can also be drawn as a cycle. In this case the cycle consists of these steps: identification, design, implementation and evaluation. Project cycle management also emphasize the significance of involvement from the target group and getting their perspectives (Blackman, 2003).

*Intervention Mapping* is an additional project-planning tool. *Intervention Mapping* also proposes different steps to go through in the development of projects. In addition, *Intervention Mapping* emphasizes the significance of the determinants behind the behaviour under focus. By identifying the determinants connected to a behaviour could make it more likely to succeed in changing the particular behaviour (Bartholomew et al., 2011). The determinants and objectives of the program are used actively to figure out how to go about in the process of changing the concerned behaviour. This is systematized by making matrixes and tables. In addition, a good evaluation is important in order to learn from and develop even better programs in the future (Schiavo, 2007; Bartholomew et al., 2011).

All the guides have many similarities. Many of the steps in the planning and managing of projects are the same. It can be reassuring that project planners are thinking in the same direction. However, *Intervention Mapping* is the newest of the guides and the active use of determinants to change behaviours is distinctive for this planning tool (Bartholomew et al., 2011).

### **2.3.1 Intervention mapping**

*Intervention Mapping* is a tool to make use of in the development of health promotion interventions. The framework systematises the process of developing interventions and gives a guided description of the steps you should follow in the process. By following these steps the intervention will be theory- and evidence based, and through this much more likely to achieve its goals (Bartholomew et al., 2011). The intervention-mapping tool can be drawn as a cycle. The cycle starts with a planning process, which consists of a needs assessment, establishment of objectives, selection of methods and production of program components. The planning process is followed

by an implementation and monitoring stage and the cycle ends with an evaluation (Bartholomew et al., 2011). The planning tool focuses on, among other things, the determinants connected to the behaviour under change, making them important in the elaboration of programs.

Several interventions have used *Intervention Mapping* in the work of developing programs on topics such as fruit and vegetable nutrition program (Weber Cullen et al., 1998) and energy saving (Kok, Lo, Peters & Ruiter, 2011).

### **2.3.2 Intervention design**

A randomized controlled trial (RCT) is the strongest intervention study design, including a randomized assessment of intervention and control group. In RCT's the people who get the intervention is not decided in advance. The individuals are randomly divided between an intervention group and control group. This randomization reduces the likelihood that an observed change in the intervention group has occurred as a consequence of factors outside the intervention (Nutbeam & Bauman, 2006). Pre-post studies however have a pre-experimental design. The study sample consists of only one group. In this group there are conducted before-and-after measurements (Nutbeam & Bauman, 2006). A study design like this gives us not compelling evidence of the intervention effects, due to it's lack of a control group, but produces estimates of the likely effects of the intervention and is advantageous for pilot studies (Nutbeam & Bauman, 2006). In order to evaluate the possible effects of pre-post studies, measurements taken at baseline are compared with measurements done at later follow-ups (outcome evaluation). In interventions with a pre-experimental design these measurements are done in the same group, in opposed to in RCT's were these measurements are done in both control and experimental group.

An evaluation can have different purposes. Outcome evaluation is about aiming at measuring whether the intervention reached it goals. This could be improved knowledge, activity patterns or skills. Questionnaires are a common measurement tool in this respect. In addition, a process evaluation can be done. This focuses on the evaluation of the implementation process, and is meant to answer questions like, to

what extent did the participants like the intervention / different components of the intervention? How can the intervention be improved?

## 3.0 Methods

### *3.1 Development of the bread baking intervention*

Components from the planning tools *Intervention Mapping* and *Rothschild's framework* were used in the development of the intervention. The determinants proposed by Rothschild (motivation, ability and opportunity) were actively used in the development of the intervention, in addition to the planning tool *Intervention Mapping*. The planning tool and framework helps getting the intervention more effective in reaching its goals (Bartholomew et al., 2011).

#### **3.1.1 Selection of specific determinants**

The first step in the intervention mapping cycle is to conduct a needs assessment. In this step there are among other things important to go deeper into the process of understanding the behaviour you are trying to change or influence, and the determinants connected to it (Bartholomew et al., 2011). So why is it that the so many of the Norwegian population don't make their own bread? Is it a lack of knowledge, time, or maybe skills?

According to a report from SIFO the majority of the Norwegian population buy their bread in grocery stores. Homemade bread are most common among families with children in the household, but the percentage that engaged in bread baking ones a week or more often is still small (13 %) (Bugge et al., 2008). This is the state despite that homemade bread had a renaissance in the 60-ties and 70-ties. People also tend to make use of more ready-made bread and cake mixes when they bake (Bugge et al., 2008). This signifies that they seek easy and timesaving solutions when they engage

in baking. The report from SIFO indicates that there are several reasons why people don't engage in bread baking. Among these reasons was, e.g. lack of knowledge about how to bake bread, lack of time and problems with getting a good result when baking (Bugge et al., 2008). The ones who baked on a regular basis reported that they did it because homemade bread tasted better, it was healthier and they liked baking (Bugge et al., 2008).

In order to influence people to a behaviour change it is important to use the available knowledge in connection to the concerned behaviour (Schiavio, 2007). The report from SIFO signifies that skills, knowledge and time are important factors influencing on peoples baking habits. These are all factors that can influence on a persons attitude and motivation towards baking. With concerned to the bread-baking intervention the determinants chosen and later operationalized were rooted in the framework proposed by Rothschild. *Rothschild's framework* consists of three groups of determinants, *motivation*, *ability* and *opportunity*. These three groups of determinants were operationalized to fit the bread baking intervention, and the following specific determinants were included: *attitude* (motivation), *knowledge and skills* (ability) and *time* (opportunity). Thus, the bread baking intervention set out to try to influence the participant's bread baking habits through the four determinants, i.e. attitude, skills, knowledge and time.

No studies that I am aware of have assessed possible determinants of bread baking among the Norwegian population. And in this regard this bread-baking project will be a pilot study testing among other things how effective the selected determinants are on influencing bread-baking habits.

### **3.1.2 Establishment of change objectives**

The objective of the bread baking intervention was to develop and implement a intervention with the purpose of getting people to start baking their own bread in order to get them to eat healthier bread and reduce or substitute sedentary behaviour. When the projected behaviour change is stated the writing of performance objectives

can be done. In order to do this, the concerned behaviour (i.e. bread baking) needs to be broken down into the creation of performance objectives. Performance objectives state precisely what the target group need to do to attain the desired behaviour. In order to engage people in bread baking they have to, *wish to bake bread, be able to bake* and *have the time to bake*, which are the performance objectives connected to bread baking. The performance objectives are further broken down and specified (see table 3.0).

**Table 3.0 Performance objectives for getting people engaged in bread baking**

<i>1. Wish to bake healthy bread</i>	<i>2. Be able to bake</i>	<i>3. Have the time to bake</i>
1.1. Get knowledge about the benefits connected to homemade bread	2.1. Learn how to bake bread 2.2. Get introduced to an ideal bread recipe	3.1. Learn to bake with a less time-consuming recipe

Table 3.0 states the performance objectives related to bread baking. The three objectives (*wish to bake bread, be able to bake bread and have the time to bake bread*) are broken down into more specified description of what needs to be done in order to achieve these three objectives. For example, in order to get the participant capable of baking bread, they need to learn how to bake bread and get introduced to a bread recipe. The performance objectives are again used in the development of the matrix of change objectives (Bartholomew et al., 2011).

Change objectives tell what is required for the accomplishment of the performance objectives. To be able to create matrixes of change objectives you need knowledge about the determinants behind the health behaviour the program is trying to affect (Bartholomew et al., 2011). The four change objectives connected to the bread baking intervention involved *getting the participants positive towards baking their own bread* (attitude), *get them to learn what a healthy bread was* (knowledge) and *how to bake this bread* (skills). In addition, they were *introduced to a less time consuming recipe* (time), thus having the opportunity *to adjust the baking to their own timetable* (time) (see table 4.0).

**Table 4.0 Matrix of change objectives for the bread baking intervention**

Performance objectives	Motivation	Ability		Opportunity
	<i>Attitude</i>	<i>Knowledge</i>	<i>Skills</i>	<i>Time</i>
*Wish to bake healthy breads	*Get positive to bake their own bread	*Learn what a healthy bread is		
*Be able to bake			*Learn to bake	
*Have the time to bake				*Use a less time consuming recipe *Adjust the baking to their own timetable
<b>INTERVENTION</b>	Lecture	Lecture	Baking course	Baking course

In table 4.0 the performance objectives are connected to the determinants of the behaviour (motivation, ability and opportunity). Determinants and performance objectives are what build up the matrix of change objectives, in addition to the change objectives. Change objectives express what need to be done in order to create a change in the desired health behaviour and are an important tool in the Intervention Mapping framework (Bartholomew et al., 2011).

### 3.1.3 Pilot study evaluation

The intervention was evaluated through a pilot study including process and outcome evaluation (see appendix 1). With respect to the process evaluation the goal was to assess the interventions relevance and attractiveness. The outcome evaluation looked at the effects of the intervention (e.g. baking habits, bread coarseness, bread knowledge and TV/DVD/PC habits). Both process and outcome evaluation was assessed by questionnaires.

The bread baking intervention was a pilot-study with a pre-experimental design (i.e. a one-group sample in which before-and-after measurements were performed). The intervention included 51 participants who attended a two-day baking course. By joining the intervention the participants committed themselves to bake minimum four times during the two following weeks after the intervention. The participants were given all necessary ingredients and devices for this commitment period. People with

celiac disease, people who were part of weight reduction programs and people who baked bread regularly, were excluded. The majority of the participants were recruited among the employees at the University College of Oslo and Akershus, *Vestbygda* Elementary School and *Fredholdt* Nursing Home, as well as among parents at *Karihaugen* Kindergarden and users of *Akropolis*. In addition, a part of the study sample was recruited by the “snowball-method”, i.e. from the social networks of the people already included in the study.

As part of the evaluation of the study, a total of three questionnaires were developed and distributed to the participants.

## 4.0 Results

To accomplish the change objectives it was decided to develop an intervention including a practical baking course and a theoretical lecture, which had the potential of affecting the 4 change objectives (see table 4.0). This was done in order to affect the determinants connected to bread baking, which again had the potential of changing the concerned health behaviour. The bread-baking intervention consisted of a lecture and a bread-baking course, and was implemented over two days.

By participating in the intervention the participants were supposed to learn how to bake bread, get introduced to a less time consuming recipe, and get knowledge about what healthy bread is. In addition, the course and lecture was intended to affect the participant’s attitude towards bread baking. The course and lecture had in this way the potential of affecting the participant’s attitude, knowledge, skills and (perceived) time, in addition to the change objectives and the overall determinants (motivation, ability and opportunity). The baking course included practical work, in order to influence the participant’s skills. The lecture focused more on theoretical aspects connected to bread and health, thus trying to affect the attitude and motivation towards baking, in addition to increasing the knowledge with concern to bread and health among the participants. How this course, lecture and material were put together was important, a well-developed lecture and course would make it more likely that the intervention would be effective in influencing the desired behaviour change.

The material the participants were given included a printed version of the lecture (included in this thesis as an appendix), and a recipe booklet (included in this thesis as an appendix).

## *4.1 The baking course*

As part of the intervention an "ideal" bread recipe was developed. The recipe was developed through a thoroughly literature search, practical testing and discussion. This recipe was put together with the intent of it being healthy, good tasting and easy to make. To make the bread recipe healthy the coarseness was made high (78%). This was achieved by including a lot of whole grain in the recipe. A large amount of water was also a part of the recipe, thus the energy content was reduced and the shelf life improved. In addition, the recipe was based on prolonged fermentation at a low temperature in refrigerator (up to 24 hours). This was done in order to end up with an easy and less time-consuming recipe, in addition to trying to improve the uptake of nutrients from the bread.

The baking course offered the opportunity of guiding the participants through the recipe and how the bread was made, thus giving them the right skills and focusing on the change objective, "Learn to bake". The course was arranged so that one of the course leaders demonstrated the recipe and the other walked around and answered possible question, and made sure that the participants had understood and mastered the recipe. Since the bread the participants learnt to bake was based on prolonged elevation, the course lasted over to nights. At the first gathering the dough was made and put to rise in the refrigerator until the next day. The next day the bread was baked in the oven and the lecture took place. To base the recipe on cold raising divides the work load connected to bread baking between to days, and was part of the work of affecting the change objectives, "Use a less time consuming recipe" and "Adjust the baking to their own timetable".

After they had completed the course all the participants went home with bread they had baked themselves, a recipe booklet and the necessary baking devices and

ingredients for the commitment period. The recipe booklet the participants were given included a step-by-step description of how to go about in the making of the bread (see appendix 4). This description included self-explanatory pictures of the different steps. The booklet was printed on a good quality paper, which made it more sustainable. The thought behind the leaflet was that it should be a guiding tool for the participant when they started baking on their own.

## ***4.2 The lecture***

As part of the participation in the intervention the participants attended a lecture (see appendix 3). The lecture was made as a power-point presentation and was presented by the use of a canvas and projector. The presentation lasted for about 45 minutes. The lecture included information about the benefits connected to homemade bread. These benefits were connected to health, both also to environment, every day activity and economy. The theory in the presentation was presented by the use of explanatory pictures and examples. The lecture where composed with the intent to affect the change objective, “get the participants positive to bake their own bread”, and “learn what a healthy bread is”, thus influencing their motivation and knowledge regarding bread and baking.

## ***4.3 Summary of results from evaluation study***

The result from the evaluation study is presented in the article (appendix 1) and poster (appendix 2). Below is a summary of the results.

The outcome evaluation showed a significant increase in reported baking frequency during the last two weeks. In addition, there was observed a significant increase in the percentage of participants reporting that bread eating at home mainly was home-baked. The bread eaten was also significantly coarser after, compared to before attending the intervention. The two determinants that showed a statistical significant increase were baking skills and self-rated knowledge. With respect to the other baking determinants a non-significant decrease in motivation was observed, in addition to a

non-significant increase in perceived time to bake. Measurements of TV/DVD and PC habits showed a reduction in the time spent using these devices, however these data was not statistical significant.

The process evaluation showed satisfied participants, e.g. all of them rated the process evaluation items as either “good” or “very good”. The process evaluation indicator who got one of the lowest score was the relevance of the lecture.

## 5.0 Discussion

### *5.1 Discussion relating the results from the pilot study to the intervention development*

#### **5.1.1 Outcome evaluation**

The study observed an increase in the baking frequency among the participants. This was seen at both follow-up 1 and 2 (see appendix 1). The recipe was developed to be attractive, both in respect to effort, taste and health. The bread recipe was also developed to make it easy and less time consuming than other recipes, in order to try to give the participants time and chance to bake bread. Most bread recipes are time-consuming because they require fermentation at several stages. By the use of long fermentation time at a cold temperature, the actual time spent on baking are reduced and the workload are divided between two days. In total, the intervention bread requires approximately 20 minutes of kneading at day one and approximately one and a half hour baking in the oven at day two. Moreover, studies have also shown that long time elevation can reduce the formation of phytic acid, witch is a substance that have the potential of affecting the uptake of nutrients in a negative manner (Dewettinck et al., 2008; Kumar et al., 2009).

In a busy every day, when people often feels that there is a shortage of time, baking bread can feel like a unreachable task. By giving the participants a recipe that is easy

to manage, both in respect to skills and time committed the likelihood of getting them to engage in bread baking probably will be stronger. Lack of time was also mentioned as an influencing factor in relation to why people don't bake bread (Bugge et al., 2008).

A significant increase in baking skills was observed (see appendix 1). By being guided through the recipe and making bread on their own, their skills have been improved. In addition, this could have contributed to an increased confidence regarding the participant's abilities to bake bread. Self-efficacy is a well-known influencing factor with respect to behaviour change. According to a study implemented by Richert et al (2010) it is essential that people have confidence regarding their abilities. This is important in order to be able to complete a behaviour change. If this confidence (self-efficacy) is lacking the benefits from health promotion interventions may not be as beneficial (Richert et al., 2010).

However, the intervention does not tell us if it was the change in skills that affected the increase in bread baking. However, knowledge alone is an insufficient factor in relation to influencing health behaviour (Brug, 2008). Practical skills are often also needed in order to bring about a behaviour change. Thus, a combination of knowledge and skills might have influenced on the increased baking frequency. Further, the self-rated knowledge in connection to bread knowledge did show an increase at the follow-ups. With respect to the determinant, time, the outcome evaluation showed no statistically significant increase in perceived time to bake. The score on this variable was relatively high at baseline, and a further increase might be hard to find. Perhaps the participants also felt that the kneading of the dough took much time. At the course and in the recipe booklet it was stressed that the kneading was good every day activity and that the time spent on kneading was important in order to end up with successful breads. The motivation among the participants did also not increase from baseline to the follow-ups. As with the perceived time to bake, the motivation was already high at baseline and therefore an increase might be difficult to see.

The Norwegian population do not apply with the official recommendations for physical activity, and the intervention also had a goal of reducing sedentary behaviour. This goal could have come in conflict with the recipe being timesaving. At the same time as wanting the participants to have a recipe that was timesaving an easy

to make, the goal was also to get them in more activity and reduce the time spent on sedentary activities. The needs assessment revealed that time was a factor that influenced people's bread baking habits. Thus, making a timesaving recipe was important. However, making bread will nevertheless require some use of energy and might make people use less time on sedentary behaviours. The outcome evaluation also showed a decrease in the time spent on watching TV, however these findings were not statistical significant. The small sample size in the intervention might not have managed to capture a change in TV/DVD habits.

### **5.1.2 Process evaluation**

The process evaluation showed that the participants were satisfied with the intervention. All of the items connected to the process evaluation questions were rated as "good" or "very good". These positive data might have been affected by the close connection between the participants and the course holders. There was close contact between the two on the course and several of the participants knew of the course holders before they joined the intervention. Maybe this made it more difficult to criticize. But, the active role of the participants could also have affected the contentment of the participants. During the lecture the participants were given the opportunity to be active. By having a quiz and asking for the participant's opinion regarding different issues the participants had the opportunity to get involved. All the participants were also given printed hand outs of the power-point presentation. Hence, reinforcing the message and getting there full attention during the presentation (Holli et al., 2009), in addition to giving the participants the opportunity to look at the material at a later time.

Feedback from the participants indicated that some felt that the bread had too much moisture and that it was perceived as being raw. However, because of the high water content of the recipe this was how the bread should turn out. On the other hand, the participants were only introduced for one bread recipe. Perhaps giving them a sample of recipes to choose among would have been better. A selection of recipes would have given the participants a chance to vary what they baked, and also an option to choose

the recipe they liked best. Perhaps this would have influenced more people to start and maintain their baking. The recipe booklet they were given could therefore have had alternative recipes included in it. Moreover, samples of these alternatives could have been given at the course, and based on this tasting the participants could have decided which recipe they wanted to use.

## ***5.2 Method discussion***

### **5.2.1 Intervention development**

As discussed earlier introducing new habits or changing old ones is not an easy task, and to succeed in this task knowledge about the determinants related to the behaviour is important.

Since the determinants connected to bread baking wasn't well known, determinants from Rothschild's framework were used in the development of the intervention. These determinants have not earlier been explored in connection to bread baking habits and their suitability are therefore not known. SCT is a well-known and commonly used theory when trying to affect health behaviours, and it has been used with success in among other, programs trying to affect dietary change (US Department of Health and Human Services, 2005). However, *Rothschild's framework* combines elements from different known theories, including SCT. This combination of components from different theories gives us a framework that can have the potential of reaching out to even more people than one theory alone. Often the use of several theories may be beneficial in order to match the various levels of the interventions objectives (Nutbeam et al., 2010). Further, the needs assessment indicated that lack of time (opportunity) and knowledge about bread baking (ability) was factors affecting bread-baking habits. This indicates that *Rothschild's framework* were suitable for the intervention.

Furthermore, intervention mapping was used as a planning tool. To have a theoretical framework and planning tool in the work of developing an intervention is beneficial

(Bartholomew et al., 2011; U.S Department of Health and Human Services, 2005). *Intervention Mapping's* focus is on among other things revealing the determinants behind a concerned behaviour, thus making the combination with Rothschild's framework appropriate. The three determinants from *Rothschild's framework* were further operationalized to fit the intervention. From the three determinants (motivation, ability and opportunity) four operationalized determinants were selected and used in the intervention (attitude, knowledge, skills and time).

However, the use of *Intervention Mapping* and *Rothschild's framework* was done rather simple. Intervention mapping focus on six steps to go about in the planning of interventions, (e.g. needs assessment, preparing matrices of change objectives, selecting theory informed intervention methods and practical applications, producing program components and materials, planning program adopting, implementation and sustainability and planning for evaluation) (Bartholomew et al., 2011). Because the bread baking intervention was a pilot study, and there was no time and resources for going through all of these steps, elements from different steps were used, in addition to selected determinants from *Rothschild's framework*. Nevertheless, the intervention was grounded in and inspired by *Intervention Mapping* and *Rothschild's framework*, and based on the two the development of change objectives for the intervention was made. Thus making the basis of the intervention strong and well founded.

In order to get the message through to all the participants the content of the lecture where adjusted to an easy literacy level. This was done by conscious not using difficult words and trying to explain and use examples. In addition, pictures were used to get the presentation more visual and understandable. A review that assed the effects of pictures on health communication showed that the use of pictures can increase a person's adherence, attention and comprehension (Houts, Doak, Doak & Loscalzo, 2005). However, maybe some perceived this as the lecture didn't have enough depth and that they wanted to learn more. The process evaluation also got feedback on that the lecture could have been longer. But, for some of the participants who were most interested in bread baking the theoretical parts of the lecture could have been perceived as to long. The process evaluation also showed that the relevance of the lecture were one of the process evacuation indicators who got the lowest score. Nevertheless, the theoretical parts were important in order to fully understand the

benefits connected to home baked bread. These benefits were again central in the process of increasing the participant's knowledge and getting them motivated and positive to start baking bread. In addition, the evaluation showed an increase in self rated bread knowledge from baseline to the measurements at the follow-ups, indicating that the lectures content could have had an influence on the participants.

The baking courses were held at the school kitchens at Oslo and Akershus University College (HIOA) and Vestbygda elementary school. By having the courses at the workplace of where the participants were recruited from, or in their local area, did make a possible participation more easy and convenient. This was also the plan for the participants from Karihaugen kinder garden. However, the facilities at the kinder garden were found not suitable for carrying out a course. Therefore the participants from Karihaugen had to attend the course at HIOA. This decision made that the intervention lost a great deal of participants, who did not have the possibility or felt that it was too much trouble getting to HIOA. Thus, examining the opportunity to hold a course at a place should be done in good time before deciding to use the place or not. In addition, good communication with the contact person from a recruitment place is important.

The first baking course that was conducted was held with 19 participants. This number proved to be too high, and could potentially have affected the quality of the first course. All of the participants did not receive the attention and the follow-up they were entitled to. The kitchen facilities at the school where the course took place was also not suitable for that many people. Too few ovens at the school kitchen required the participants to put up to four breads in one single oven. This again led to prolonged baking time and some breads being damaged. Many people who wanted to participate and a wish of including as many as possible on the course were the reasons for the first course being so full. When the other courses were carried out the number of participants was adjusted to the facilities and what was practically possible. With fewer participants on the courses the time and opportunity to guide and follow up the participants were much better.

The participants in the intervention were given all necessary baking devices. This both could have influenced their participation, motivation and contentment, but it also

offered them the ability and opportunity to start baking. But the use of incentives in interventions is not always positive. For example, to offer money to study participants can have ethical difficulties. Suddenly some people don't have a choice anymore, they can't afford to say no, and the voluntary participation may not be as voluntary anymore. On the other hand, in the case of the bread baking intervention there were no money involved only baking equipment's. This was not solely done to attract participants, but also to justify the commitment time.

## **5.2.2 Pilot study design**

### **Study design**

The bread baking intervention pilot study was developed with a pre-experimental design. This implies that all the data came from one group (Nutbeam & Bauman, 2006), there was no control group. Thus, the results from the intervention cannot give evidence of a clear association between the measurements taken. A RCT would be a stronger study design, however it is believed that a control group would not have started baking in the intervention period. Also, the intent of the intervention was to test the feasibility of the intervention, for this purpose a pilot study is suitable.

### **Study sample**

If the intervention were to be extended a larger sample size would have been necessary. A larger sample size would have given the study better statistical strength and a sample selected at random would have been crucial if the results were to be generalized. In addition, the duration of the study and commitment time then should have been longer. Furthermore, the bread baking intervention was open for all, despite those with celiac disease, and those attending other lifestyle courses. Thus, the participants wanting to take part in studies like this is often interested in nutrition and health (e.g. bread baking). On the other hand, it would have been interesting to test the intervention on a different sample, a group of people that weren't so motivated and aware of health and nutrition.

## **Instruments**

The questionnaires didn't include questions about what kind of bread the participants baked. Since this wasn't assessed we do not know if the participants baked the healthy bread they learned to bake at the course. On the other hand, making homemade bread, whatever kind, is anyway in most cases better than purchased bread. But the most useful had possibly been to have a question that asked if the participants baked by the use of the recipe learned at the course. Furthermore, except for the questions related to TV/DVD/PC habits (van Stralen et al., 2011) none of the questions in the questionnaire were validated. This may weaken the study's internal validity. Moreover, the time spent on TV/DVD/PC was self-reported, which again can affect the power of this measurement.

Including other parameters, like blood lipids, weight and body mass index (BMI) would have been beneficial in order to assess the interventions effects on health and related outcomes. However, due to the time and recourses connected to the intervention this was not possible to carry out.

## **5.2.3 Study strengths and limitations**

A strength with the present bread baking intervention is that it's based on a theoretical framework, namely *Intervention Mapping* and *Rothschild's Framework*. These theoretical frameworks are based on factors that are identified as essential in relation to health behavior change, and are therefore important in order to succeed in health promotion work. However, because of the time and recourses connected to the master thesis the use of these frameworks was done quite simple.

In light of being a pilot study, the bread baking intervention had its limitations. The sample size, the design and duration of the study was part of the constrains connected to the pilot intervention. With respect to the sample, the size and characteristics of it was problematic. A small sample with a high percentage of women and highly educated people is not representative for the general population. Furthermore, the design of the intervention implies that all the measurements are done in the same

group without any controls, thus cannot give convincing evidence that observed changes in the study sample is due to the concerned intervention. Additionally, the short follow-up period in the study cannot give a truthful picture of the long-term effects of the intervention.

For more thorough descriptions of the strengths and limitations connected to the study, see the article (attached as appendix 1).

### **5.2.3 Conclusion**

A bread baking intervention was developed and implemented using the frameworks *Intervention Mapping* and *Rothschild's framework*. The intervention was a pilot study aiming at engaging people in bread baking and reducing or substituting sedentary behaviours. The intervention demonstrated an increase in the baking frequency, the coarseness of the bread eaten, and the amount that ate home baked bread among the study sample. Furthermore, the skills and knowledge connected to bread baking and bread and health improved among the participants after the intervention.

Future studies ought to assess the potential health implications of bread baking.

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**Outcome and Process Evaluation of a Bread Baking  
Intervention  
- A Pilot Study**

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**Short title:** Evaluation of a bread baking intervention

## **Abstract**

**Objective:** To determine the outcome and process evaluation of a bread baking intervention aiming at getting people to start baking their own bread in order to; (1) eat a healthier bread, and (2) reduce their sedentary behaviours (i.e. TV watching).

**Design:** A bread baking intervention was developed and tested in a pilot study with a pre-post design (no control group). The intervention consisted of a two-day baking course and a commitment period in which the participants committed themselves to bake bread at least four times over a period of two weeks after the course. Baking habits (times per last 14 days) and TV/DVD/PC habits (minutes/weekdays, weekends, and yesterday) were measured by a questionnaire on three occasions – at baseline, two weeks (follow-up 1) and two-three months after the course (follow-up 2). Wilcoxon Signed Ranks Test was used to assess the impact of the intervention on baking and TV/DVD/PC habits.

**Setting:** Norway.

**Subjects:** Of a total of 51 participants (both men and women), 46 completed all three questionnaires. They constitute the study sample of the present paper.

**Results:** A statistical significant increase in the baking frequency was observed; from 0.2 times/last 14 days at baseline to 2.7 times/last 14 days at follow-up 1 ( $p < 0.001$ ), and 1.2 times/last 14 days at follow-up 2 ( $p < 0.001$ ). Furthermore, a non-significant decrease in the prevalence of TV watching was indicated; from 97 minutes/day at baseline, to 81 minutes/day at follow-up 1 ( $p = 0.31$ ), and 82 minutes/day at follow-up 2 ( $p = 0.23$ ).

**Conclusions:** The bread baking intervention was effective in increasing bread baking frequency, also beyond the 14 days of commitment time. Whether increased bread baking results in a lower frequency of TV watching needs further investigation.

## Introduction

Despite frequent discussions in the media about the health benefits of carbohydrates in general and bread in particular, bread still is an important part of the diet for most Norwegians. In a survey recently conducted on behalf of The Norwegian Bread and Cereals Marketing Board, it was for example indicated that 76 and 67 percent still incorporates bread (i.e. bread, crackers, rolls and baguettes) in their breakfast and lunch meals at a regular basis, respectively. Only five percent answered that they did not eat bread at all <sup>(1)</sup>.

However, the survey did also indicate that bread baking is a downward trend among the Norwegian population. When asked where they normally obtained their bread, 19 percent of the respondents stated that they were baking their own, however, not exclusively as 85, 15 and 1 percent were reporting to buy it in the grocery store, bakery or petrol station, respectively. Despite the fact that 19 percent is relatively high, 24 percent of the respondents did at the same time report to have eaten less home-baked bread the last couple of years <sup>(1)</sup>.

There are several arguments for why we should bake our own bread. Some of them are related to factors like nutrition and everyday activity. In relation to the nutritional aspects, it is for example well-known that most industrial breads are high in both salt and food additives <sup>(2)</sup>. By baking ourselves we are able to control what the bread contains and adjust the content of e.g. whole grains, fat, salt and water (the more water, the less energy). As an everyday activity, bread baking may furthermore be a contributing factor in breaking up and substitute sedentary behaviours (for example TV watching). Although baking only may be classified as a light-to-moderate intense activity, there are several authors suggesting that there may be the lack of engagement in such type of activities that causes the adverse health-effects observed from a sedentary lifestyle (3,4,5) (i.e. weight gain and all-cause mortality) (6,7).

The present study assess the outcome and process evaluation of an intervention developed to get people to start baking their own bread in order to; eat healthier bread and reduce their sedentary behaviours (i.e. TV-watching).

## Experimental methods

### ***Theoretical framework***

The present bread baking intervention was a pilot study with a pre-experimental design (i.e. a one-group sample in which before-and-after measurements were performed). The intervention was developed with inspiration from *Intervention Mapping* <sup>(8)</sup>, and based on *Rothschild's Framework* <sup>(9)</sup> of determinants affecting health behaviour change. From now only referred to as *Rothschild's Framework*.

### **Intervention Mapping**

*Intervention Mapping* is a technique used in the planning and development of interventions and can be drawn as a cycle <sup>(8)</sup>. The cycle starts with a planning process consisting of a needs assessment, establishment of objectives, selection of methods and production of program components. The planning process is followed by implementation and monitoring, before the cycle ends with a process evaluation. Based on scientific evidence and theories it guides how health behavior change should be induced <sup>(8)</sup>.

### **Rothschild's Framework**

It is well-known that we have to change the determinants of a behaviour in order to change the behaviour itself <sup>(10)</sup>. Based on different health communication theories (e.g. Theory of Planned Behaviour, Protection Motivation Theory and Social Cognitive Theory), four groups of factors that influence health behaviour have been identified; i.e. attitudes, self-identity, self-efficacy and social influence <sup>(10)</sup>. In *Rothschild's Framework*, as described by Brug <sup>(10)</sup>, these factors are represented by *motivation*, *ability* and *opportunity*. In the present intervention, these three determinants were further operationalized into four influencing factors, i.e. *attitude* (motivation), *knowledge* and *skills* (ability) and *time* (opportunity). Based on these factors, five change objectives were created, i.e. (1) get positive to bake bread (attitude), (2) learn what a healthy bread is (knowledge), (3) learn to bake bread (skills), (4) adopt a less time-consuming bread recipe (time), and (5) adjust bread

baking to the timetable (time). These five change objectives formed the basis for the development of the intervention. The operationalization is further described by Jensen (11).

## ***Intervention programme***

### **Baking course and commitment period**

The intervention programme consisted of a two-day baking course (both practical and theoretical) and a commitment period in which the participants committed themselves to bake bread at home for a minimum of four times over the following two weeks after the course. A total of six baking courses were carried out during October/November 2011. The courses were held in the school kitchens at the University College of Oslo and Akershus and Vestbygda Elementary School (Drammen municipality). LJ and KL were responsible for the course implementation.

At the first course day (lasting for approximately 45 minutes), the participants were shortly introduced to the intervention. Afterwards they were guided through a bread recipe developed especially for the course (see next section) and taught to make their own bread dough. The recipe was based on long and cold fermentation, and after the kneading the dough's were therefore put to storage in refrigerators until the next day (course day two). At course day two (lasting for approximately 90 minutes), a 45 minutes lecture was held while the breads were baking. The main focus of the lecture was placed on emphasizing the benefits connected to home-baked bread in relation to; health (e.g. the ability to adjust the breads coarseness, salt and water level), everyday activity (e.g. that baking may replace sedentary activities), the environment (e.g. reduced transport costs compared to industrially produced breads), economy (more economically beneficial compared to breads from the grocery shop or bakery), as well as taste. It was emphasized that the lecture should be understandable and easy to follow, e.g. by basing it on a low literacy level and with a frequent use of illustrations.

The intention with the commitment period was to give the participants some time to establish a baking habit. For this period, they were given all necessary ingredients and equipment, as well as a printed recipe booklet with pictures illustrating the baking process step by step.

## The bread recipe

The bread recipe was developed based on a literature review<sup>(12)</sup> and practical testing. First and foremost, it was emphasized that the recipe should be healthy, well tasting, timesaving and convenient. In relation to the health aspect, focus was primarily placed on the recipe to have a high coarseness and relatively low amounts of salt. To set some exact criteria in this context, it was decided that the intervention bread should achieve the criteria set out by the *Keyhole* and achieve a full *Bread scale*. These are food-labelling schemes applied in Norway to identify the healthiness of food products in general (the *Keyhole*), and bread in particular (the *Bread scale*)<sup>(13, 14)</sup>.

To achieve the Keyhole, the bread had to fulfil the following criteria: minimum 25 percent whole grains of total dry matter basis, minimum 5 gram dietary fiber per 100 gram bread and maximum 5 gram sugar, 0.5 gram salt (sodium) and 7 gram fat per 100 g bread<sup>(13)</sup>. To achieve a full Bread scale, whole grains (i.e. whole grains, whole grain flours and bran) should constitute at least 75 percent of total flour amount<sup>(14)</sup>. This resulted in a recipe (see table 1) with a high coarseness (78 percent), relatively much dietary fiber (7.6g/100g), low amounts of salt (0.2g/100g) and fat (3.5g/100g), and no added sugar. Due to a high water content, the bread also had a relatively low energy-density (173 kcal/100g).

As the fermentation process often is divided into several steps, many claim bread baking as a time-consuming activity<sup>(15)</sup>. This fact emphasizes the importance of a time-efficient fermentation technique. The recipe of the intervention bread was therefore based on a method where the dough is fermented at a low temperature (approximately 4°C) over a period of 24 hours. In this way, the workload related to the baking process is spread over two days. In total, the intervention bread requires approximately 20 to 30 minutes of mixing ingredients and kneading (day one), and one and a half hour baking in the oven (day two). It is also worth mentioning that a long fermentation time is found to increase the bioavailability, as well as the amount of several nutrients present in the bread (e.g. iron, zinc and different B-vitamins)<sup>(16, 17)</sup>.

Thus, the bread baking intervention set out to try to influence the participant's bread baking habits through the four determinants, i.e. *attitude* (by including a motivation lecture), *skills* and *knowledge* (by including an educational lecture, as well as a practical baking session), and *time* (by including an easy, timesaving and convenient bread recipe).

## ***Pilot study***

### **Study sample**

The majority of the participants were recruited among the employees at the University College of Oslo and Akershus, Vestbygda Elementary School and Fredholdt Nursing Home, as well as among parents at Karihaugen Kindergarden and users of Akropolis Training Center in Drammen. These arenas were mainly chosen based on their proximity to the kitchen facilities. Furthermore, a part of the study sample was recruited by the "snowball-method", i.e. from the social networks of the people already included in the study.

Telephone and e-mail contact was made with the concerned places and people. Furthermore, an information letter, describing the aim of the intervention and participant requirements (i.e. answering three questionnaires and bake at least four times during the two-week commitment period), was sent out. The ones interested were asked to take contact with the study coordinators by mail or telephone. People with celiac disease, people who were part of weight reduction programs and/or people who baked bread regularly, were excluded.

As an initial goal, a study sample of 50 participants was planned. This number was mainly based on practical aspects (e.g. time, facilities and economy), but also the fact that this only was a pilot study, meaning that a large study sample was not required.

A total of 51 respondents (88 percent women) agreed to take part in the study. The sample had a median age of 48 years, and 72 percent had higher education (i.e. at least three years at university college/university).

Research clearance was obtained from the Norwegian Social Science Services (NSD). Written informed consent was obtained from each participant before joining the study. All participation was voluntary.

## **Study design and instruments**

To evaluate the intervention, an outcome and process evaluation was conducted. A total of three semi-structured questionnaires were developed. The first questionnaire was filled out at the first course day (baseline), while the second and third questionnaires were filled out two weeks (follow-up 1) and two months (follow-up 2), respectively, after attending the course. Due to the Christmas holidays, and the fact that most people make some changes in their eating and cooking habits during these days, some of the participants had a longer period between questionnaire two and three (up to three months). All participants (a total of 51) filled out the questionnaire at baseline, and 49 and 46 completed the questionnaires at follow-up 1 and follow-up 2, respectively. Only the participants returning all three questionnaires (a total of 46) are included in the statistical analysis of the present study.

Information concerning their completion was given at the front page of each questionnaire. Furthermore, there was stressed that there were no right or wrong answers and that all information was made unidentifiable by the use of ID-numbers. The questionnaires were delivered and collected at the workplaces of the participants or by ordinary mail. If the questionnaire was sent by post, a prepaid return envelope was sent along. E-mails and text messages were sent out to remind the participants of filling out and delivering the questionnaires.

The three questionnaires were identical, while questionnaire two also included questions related to the process evaluation of the intervention. Each questionnaire started by asking for general information, i.e. age, highest completed education and weekday. Furthermore, the questionnaires included questions related to bread and baking habits and determinants of baking (i.e. knowledge, attitude, skills and perceived time to bake) and TV/DVD/PC habits.

### **Bread and baking habits**

To assess baking frequency, the participants were asked to state the number of times they had been baking the last 14 days. Bread consumption was assessed by asking for the normal intake of slices of bread per day, as well as the intake yesterday. Type of bread eaten was assessed by ticking of one of the following alternatives: “white” (a coarseness of 0-25 percent), “semi-whole grain” (a coarseness of 25-50 percent), “whole grain” (a coarseness of 50-75 percent) and “extra whole grain” (a coarseness of 75-100 percent) bread. The answers were later recoded into coarseness percentage (12.5, 37.5, 62.5 and 87.5 percent, respectively). Bread origin was examined by asking the participants where they normally obtained their bread. Following answer options were given: “grocery store”, “bakery”, “home-baked” or “other”. Before the statistical analysis, these answer options were sorted and recoded as home-baked (1) or not (0).

### **Determinants of baking habits**

Bread knowledge was measured by asking the participants to describe in their own words the concepts of the *Keyhole* and the *Bread scale*. The answers were assessed by the authors as right or wrong and coded into 1 and 0, respectively. Moreover, the respondents were asked to rate their knowledge about bread and health on a five-level scale (“very good”, “good”, “neither good or insufficient”, “insufficient”, “very insufficient”). These answer options were later recoded from -2 to 2, with 2 being the highest score (i.e. “very good”).

The rest of the baking determinants (i.e. attitude, skills and time) were respectively operationalized by the following statements: “I am motivated to bake my own bread” (attitude), “I master to bake bread” (skills) and “I have time to bake bread” (perceived time). All three statements were answered by the use of a five-level scale (“totally agree”, “agree”, “either or”, “disagree”, “totally disagree”). These answer options were recoded from -2 to 2, with 2 being the highest score (i.e. “totally agree”).

### **TV/DVD/PC habits**

To determine sedentary behavior, number of hours spent on TV/DVD and PC on weekdays, weekends and yesterday was assessed. The questions, obtained from the

ENERGY project <sup>(18)</sup>, had the following answer options; “None”, “Less than 30 minutes a day”, “30 minutes a day”, “One hour a day”, “One hour and 30 minutes a day”, “Two hours a day”, “Two hours and 30 minutes a day”, “Three hours a day”, “Three hours and 30 minutes a day”, “Four hours or more a day”. Before the statistical analysis, these answer options were recoded into number of minutes (i.e. from 0 to 240 minutes or more).

### **Process evaluation**

Process evaluation was assessed by measuring the *attractiveness* and *relevance* <sup>(19)</sup> of the intervention. These were operationalized by asking questions related to course enjoyment and course relevance, respectively. The assessment of course enjoyment included four questions: “How did you like the bread baking course/the bread baking/the lecture/the bread?” Following response alternatives were given; “very good”, “good”, “bad”, “very bad” and “neither good or bad”. The three questions related to course relevance included: “How relevant do you think the bread baking/the lecture was for you?” and “How much benefit do you feel that you have had of the course?” Following answer options were given: “very useful”, “useful”, “less useful”, “very little useful” and “neither useful or useless”, as well as “large benefit”, “some benefit”, “little benefit”, “very little benefit” and “either or”. All the response alternatives in relation to the process evaluation were scored from -2 to 2, with 2 being the highest score (i.e. “very good”/“very useful”/“large benefit”). Enjoyment and relevance scales were developed by aggregating the variables related to each of them. The scales ranged from -8 to 8 (enjoyment) and from -6 to 6 (relevance).

### **Statistical analysis**

Statistical Package for the Social Sciences (SPSS, version 19.0) was used for all the statistical analysis. Mean values and standard deviations (SD) for age, gender and education were calculated for the whole sample. The effects of the intervention were analyzed by using Wilcoxon Signed Ranks Test to assess changes in the data between baseline and follow-up 1, and between baseline and follow-up 2.

Two-sided p-values were used to assess whether the associations were statistical significant. The significance level was set to 0.05.

## **Results**

### **Outcome evaluation**

A statistical significant increase in reported baking frequency during the last two weeks was observed; from 0.2 times at baseline to 2.7 times at follow-up 1 ( $p<0.001$ ). By follow-up 2, the corresponding frequency had decreased to 1.2 times, but still, it was significantly higher compared with baseline ( $p<0.001$ ). Furthermore, there was observed a significant increase in the percentage of participants reporting eating home-baked bread - from 4 percent at baseline to 33 percent at follow-up 1, and 40 percent at follow-up 2 (both  $p<0.001$ ). Compared with baseline, the bread eaten was also significantly coarser at both follow-up 1 (58 % vs. 63 %,  $p=0.05$ ) and follow-up 2 (63 %,  $p=0.01$ ) (see Table 2).

Significant increases in the knowledge scores (i.e. in relation to the *Keyhole* and the *Bread scale*) were observed from baseline to follow-up 1 (28 % to 61 % ( $p<0.001$ ), and 39 % to 72 % ( $p=0.001$ ), respectively). These values remained stable at follow-up 2. Also the respondents self-rated knowledge score did increase; from 0.5 at baseline to 1.1 at follow-up 1 ( $p<0.001$ ), and 1.0 at follow-up 2 ( $p<0.001$ ) (see Table 2).

Regarding the other self-rated baking determinants (i.e. attitude, skills and time), a significant increase was only observed for skills – from 1.4 at baseline to 1.8 at follow-up 1 ( $p=0.008$ ), and 1.7 at follow-up 2 ( $p=0.01$ ).

The variables measuring time spent on TV/DVD indicated a non-significant decrease between baseline and the two follow-ups; from 96.9 minutes per day at baseline to 81 minutes per day at follow-up 1 ( $p=0.31$ ), and 82.2 minutes per day at follow-up 2 ( $p=0.23$ ) (based on minutes watched yesterday). In relation to the time spent on PC there was observed inconsistent changes, all non-significant (see Table 3).

### **Process evaluation**

The mean scores of the course enjoyment and course relevance scales were 6.5 and 4.2, respectively (see Table 4), and all participants rated the process evaluation items as “good” or “very good”.

With respect to baking frequency (last fourteen days) and TV/DVD habits (yesterday), there were not observed any changes between respondents with high vs. moderate enjoyment and relevance scores (data not shown). All groups followed the trends described above, i.e. a significant increased baking frequency and a non-significant decrease in time spent on TV/DVD.

## ***Discussion***

The purpose of the present study was to assess the outcome and process evaluation of an intervention developed to get people to start baking their own bread in order to; eat a healthier bread and reduce their sedentary behaviors (i.e. TV-watching). While the results indicated that the intervention failed in significantly affecting the participants TV-habits, it was observed that it was effective in increasing the bread baking frequency - also beyond the fourteen days of commitment time. According estimates from follow-up 2, 32 (i.e. 70 percent) of the respondents reported to have baked bread at least once over the last two weeks. The highest baking frequency reported in this context was eight times. However, as table 2 demonstrates, a high percentage (60 percent) was still reporting to obtain their bread from the grocery store or bakery. It may therefore be assumed that the respondents – in addition to bake their own – still buy some of the bread they eat. The practical significance of an increased baking frequency is therefore rather unclear.

One of the strengths with the present bread baking intervention is its theoretical framework. Both *Intervention Mapping* and *Rothschild's Framework* are based on factors that are identified as crucial in relation to health behavior change <sup>(8,9,10)</sup>. However, despite a wide focus on facilitating the participants' attitude and perceived time to start baking (e.g. by the use of a motivation lecture and by providing them with baking ingredients, equipments and a recipe), the results indicated that none of these factors were significantly changed. In part, this may be explained by the fact that the participants were quite motivated to start baking already at baseline. A further increase in this parameter could therefore have been hard to obtain.

At the same time, it is important to emphasize that significant increases in the participants' knowledge and self-rated baking skills were observed. The question is, however, whether these two factors alone may explain the observed changes in baking

habits. In spite of models like the KAP model (Knowledge-Attitude-Practice), claiming that knowledge is affecting our behaviours through influencing our attitudes <sup>(20)</sup>, knowledge alone is generally not considered strong enough to induce behavior changes <sup>(10)</sup>. Together with skills, knowledge is on the other hand claimed by Bandura's Social Cognitive Theory as an essential factor in building up self-efficacy <sup>(21)</sup>. Self-efficacy, which can be viewed as a persons confidence in his or hers ability to adapt to a specific behaviour, is identified as a crucial influencing factor by several health behaviour theories (e.g. Social Cognitive Theory, Theory of Planned Behaviour and the Health Belief Model) <sup>(10, 21)</sup>. In the case of the present intervention it is therefore reasonable to assume that an increased baking frequency to some extent may be explained by higher levels of self-efficacy among the participants. This could be due to the combined effect of improved knowledge and baking skills.

Limitations of this study include (1) its small and indefinable study sample with a high percentage of women. As the baseline characteristics indicated, the respondents were furthermore quite motivated to start baking already at that point. Partly, this may be explained by the fact that the sample largely consisted of people highly educated. This group is also suggested to be more prone to take part in and respond positively to health-promoting initiatives like the present intervention <sup>(19)</sup>. Again, this may have resulted in more beneficial outcomes than would have been achieved if the intervention included a more representative sample. All in all, these aspects may impair the external validity of the intervention and hence the generalisability of the findings to a broader population. (2) Furthermore, the intervention was based on a one-group design, implicating that before-and-after measurements were done in one group without any controls. Such a design is generally criticized for being weak <sup>(19)</sup>, as it cannot provide compelling evidence that observed changes in the study sample is due to the concerned intervention. At the same time, this was only a pilot study testing the feasibility of the intervention, and in this context, a one-group study may have been the most suitable design <sup>(19)</sup>. (3) Despite relatively high compliance during the commitment period (each participant reported to have baked at least once, highest baking frequency reported was 7 times), this period may have been too short to provide enough time for behaviours (e.g. in relation to baking) to stabilize. Furthermore, the study may have had a too short follow-up-period to provide a realistic picture of the long-term effects of the intervention. (4) Except for the

questions related to TV/DVD/PC habits, none of the questions in the questionnaires were validated. This may impair the study's internal validity. (5) Finally, the study may have had a too small sample size, and hence statistical power, to detect any significant changes in TV habits.

To our knowledge, there are no other studies reporting effects of a bread baking intervention. The present intervention did demonstrate a significant increase in the baking frequency among the participants. Despite the fact that it did not succeed in significantly reduce the time the participants spent on watching TV, the results did indicate a decreasing trend. These results call for further investigation. Further research will, however, acquire a stronger study design (e.g. a randomized controlled trial) with a larger study sample, a longer intervention period and a long-term follow-up.

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**Table 1** The bread recipe

<p><b>Ingredients (2 breads)</b></p> <ul style="list-style-type: none"><li>• 1 litre cold water</li><li>• 12.5 g yeast</li><li>• 10 g salt</li><li>• 2 dl flax seeds</li><li>• 4 dl oat flakes</li><li>• 3 dl white wheat flour</li><li>• 4 dl whole meal wheat flour</li><li>• 4 dl whole meal rye flour</li></ul>
<p><b>Procedures</b></p> <p><b>Day 1</b></p> <ul style="list-style-type: none"><li>• Mix the yeast with the water. Thereafter, add in rest of the ingredients.</li><li>• Knead the dough thoroughly for minimum 20 minutes – preferably with some short breaks.</li><li>• Put the dough in the refrigerator for 24 hours.</li></ul> <p><b>Day 2</b></p> <ul style="list-style-type: none"><li>• Divide the dough into to baking tins.</li><li>• Bake the breads in the oven at 200°C for approximately one hour and fifteen to thirty minutes.</li><li>• Let the breads cool on a rack.</li><li>• The breads should be kept in a towel after they have cooled down.</li></ul>

**Table 2** Effect of the intervention on bread and baking habits, as well as baking determinants (i.e. knowledge, attitude, skills and perceived time to bake) (N=46).

	<b>Baseline</b>	<b>Follow-up 1</b>	<b>p<sup>c</sup></b>	<b>Follow-up 2</b>	<b>p<sup>d</sup></b>
<b>Bread and baking habits</b>					
Baking frequency, last 14 days, mean (SD)	0.2 (0.7)	2.7 (1.5)	<0.001	1.2 (1.3)	<0.001
Slices of bread typically eaten a day, mean (SD)	3.6 (1.7)	3.8 (1.4)	0.22	3.6 (1.6)	0.88
Slices of bread eaten yesterday, mean (SD)	2.9 (1.6)	3.0 (1.5)	0.78	3.2 (1.6)	0.23
Type of bread, percent coarseness, mean (SD)	58	63	0.05	63	0.01
Home baked, percent	4	33	<0.001	40	<0.001
<b>Baking determinants</b>					
Knowledge, Keyhole, percent correct answers	28	61	<0.001	54	0.001
Knowledge, Bread scale, percent correct answers	39	72	0.001	76	<0.001
Knowledge (self-rated) <sup>a</sup>	0.5 (0.8)	1.1 (0.6)	<0.001	1.0 (0.5)	<0.001
Baking attitude (self-rated) <sup>b</sup>	1.5 (0.6)	1.6 (0.5)	0.38	1.4 (0.7)	0.71
Baking skills (self-rated) <sup>b</sup>	1.4 (1.0)	1.8 (0.4)	0.008	1.7 (0.6)	0.01
Time to bake (self-rated) <sup>b</sup>	1.2 (0.9)	1.5 (0.8)	0.02	1.3 (0.9)	0.15

<sup>a</sup> Very good (2), good (1), neither good or insufficient (0), insufficient (-1), very insufficient (-2)

<sup>b</sup> Totally agree (2), some agreement (1), either or (0), some disagreement (-1), totally disagreement (-2)

<sup>c</sup> Wilcoxon Signed Ranks Test, between baseline and follow-up 1. Significant at p<0.05.

<sup>d</sup> Wilcoxon Signed Ranks Test, between baseline and follow-up 2. Significant at p<0.05.

**Table 3** Effect of the intervention on TV/DVD/PC-habits (N=46)

	<b>Baseline</b>	<b>Follow-up 1</b>	<b>p<sup>a</sup></b>	<b>Follow-up 2</b>	<b>p<sup>b</sup></b>
<b>TV/DVD-habits, minutes, mean (SD)</b>					
Weekdays	107.3 (62.5)	95 (62.7)	0.32	97.8 (58.9)	0.36
Weekend	151 (55.4)	144.6 (55)	0.69	145.8 (57.9)	0.64
Yesterday	96.9 (76.3)	81 (73.2)	0.31	82.2 (66.3)	0.23
<b>PC-habits, minutes, mean (SD)</b>					
Weekdays	44.9 (51.1)	56.4 (62.9)	0.20	53.5 (53.7)	0.27
Weekends	55.9 (49.6)	67.2 (65.6)	0.10	57.1 (55.1)	0.94
Yesterday	55.4 (67.8)	47.9 (67.2)	0.32	44.4 (60.6)	0.13

<sup>a</sup> Wilcoxon Signed Ranks Test, between baseline and follow-up 1. Significant at  $p < 0.05$ .

<sup>b</sup> Wilcoxon Signed Ranks Test, between baseline and follow-up 2. Significant at  $p < 0.05$ .

**Table 4** Process evaluation items; course enjoyment and course relevance and scales (N=46)

	<b>Range/response alternatives</b>	<b>Mean</b>	<b>SD</b>
<b>Course enjoyment</b>			
1. All in all, how did you like the bread baking course?	Very good (2), good (1), bad (-1), very bad (-2), neither good or bad (0)	1.7	0.6
2. How did you like the lecture?	Very good (2), good (1), bad (-1), very bad (-2), neither good or bad (0)	1.8	0.4
3. How did you like the bread baking?	Very good (2), good (1), bad (-1), very bad (-2), neither good or bad (0)	1.7	0.5
4. How did you like the bread that was baked at the course?	Very good (2), good (1), bad (-1), very bad (-2), neither good or bad (0)	1.4	0.7
<b>Scale</b>	<b>-8, 8</b>	<b>6.5</b>	<b>1.5</b>
<b>Course relevance</b>			
1. How relevant do you think the lecture was for you?	Very useful (2), useful (1), less useful (-1), very little useful (-2), neither useful or useless (0)	1.3	0.6
2. How relevant do you think the bread baking was for you?	Very useful (2), useful (1), less useful (-1), very little useful (-2), neither useful or useless (0)	1.3	0.6
3. How much benefit do you feel that you have had of the course?	Large benefit (2), some benefit (1), little benefit (-1), very little benefit (-2), either or (0)	1.6	0.5
<b>Scale</b>	<b>-6, 6</b>	<b>4.2</b>	<b>1.3</b>

## Attachment 2, Poster



# A Bread Baking Intervention

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## INTRODUCTION

There are several arguments for why we should bake our own bread. Some of them are related to factors like nutrition and everyday activity. In relation to the nutritional aspects, it is for example well-known that most industrial breads are high in both salt and food additives (1). By baking ourselves we are able to control what the bread contains and adjust the content of e.g. whole grains, fat, salt and water (the more water, the less energy). As an everyday activity, bread baking may furthermore be a contributing factor in breaking up and substitute sedentary behaviours (e.g. TV watching). Although baking only may be classified as a light-to-moderate intensity activity, it is suggested that there may be the lack of engagement in such type of activities that causes the adverse health-effects observed from a sedentary lifestyle (2,3,4) (i.e. weight gain and all-cause mortality) (5,6).

## PURPOSE

To assess the outcome evaluation of an intervention developed to get people to start baking their own bread in order to: eat a healthier bread and reduce sedentary behaviours (i.e. TV-watching).

## METHODS

The present bread baking intervention was a pilot study with a pre-experimental design (i.e. a one-group sample in which before-and-after measurements were performed). The intervention was developed with inspiration from *Intervention Mapping* and *Rothschild's Framework* of determinants affecting health behavior change (i.e. motivation, ability and opportunity) (7, 8). These determinants were further operationalized into the following factors: *attitude* (motivation), *knowledge* and *skills* (ability) and *time* (opportunity).

The intervention programme consisted of a two-day baking course (both practical and theoretical) and a commitment period in which the participants committed themselves to bake bread at home for a minimum of four times over the following two weeks after the course. All in all, the intervention was aiming at influencing the participants: *attitude* towards baking (by including a motivating lecture), *knowledge* and *skills* (by including an educational lecture, as well as a practical baking session), and *time* (by including an easy, timesaving and convenient bread recipe).

Baking habits (times per last 14 days) and TV/DVD/PC habits (minutes/yesterday) were measured by a questionnaire on three occasions – at baseline, two weeks (follow-up 1) and two-three months after the course (follow-up 2). Wilcoxon Signed Ranks Test was used to assess the impact of the intervention on baking and TV/DVD/PC habits.

## RESULTS

A statistical significant increase in the baking frequency was observed; from 0.2 times/last 14 days at baseline to 2.7 times/last 14 days at follow-up 1 ( $p<0.001$ ), and 1.2 times/last 14 days at follow-up 2 ( $p<0.001$ ).

Furthermore, a non-significant decrease in the prevalence of TV watching was indicated; from 97 minutes/day at baseline to 81 minutes/day at follow-up 1 ( $p=0.31$ ) and 82 minutes/day at follow-up 2 ( $p=0.23$ ).

	Baseline	Follow-up 1	P*	Follow-up 2	P**
Baking frequency, last 14 days, mean (SD)	0.2 (0.7)	2.7 (1.5)	<0.001	1.2 (1.3)	<0.001
TV/DVD-habits, minutes yesterday, mean (SD)	96.9 (76.3)	81 (73.2)	0.31	82.2 (66.3)	0.23

\* Wilcoxon Signed Ranks Test, between baseline and follow-up 1. Significant at  $p<0.05$ .

\*\* Wilcoxon Signed Ranks Test, between baseline and follow-up 2. Significant at  $p<0.05$ .

## CONCLUSION

The bread baking intervention was effective in increasing bread baking frequency, also beyond the 14 days of commitment time. Whether increased bread baking results in a lower frequency of TV watching needs further investigation.

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**Vi slår et slag for brødet!**

**Line Jensen**

**Kjersti Lilleberg**

**Masterstudenter i samfunnsnærering**

## Frustrerende?



## Brøddebatten

- **"Fedon-bølgen splitter Norge"** (VG, 1. februar 2003)
- **"- Fedon-brødet er lureri"** (Dagbladet, 23. februar 2003)
- **"Ekspertens råd om brød"** (VG, 12. juni 2003)
- **"Slik lykkes du med lavkarbo"** (Dagbladet, 5. august 2011)
- **"Lavkarbo-diett fjernet flest kilo"** (Dagbladet, 7. mars 2007)
- **"Krigen om lavkarbo"** (VG, 19. september 2011)
- **"Sju av ti stoler på myndighetenes kostråd"** (VG, 30. januar 2011)
- **"Kostrådene spriker i alle retninger"** (VG, 10. oktober 2010)

# En kort innføring i karbohydrater

## Tilgjengelige

- Brytes ned og absorberes raskt i tarmen
- Gir en rask økning i blodsukkeret
- For eksempel: sukker, hvitt mel

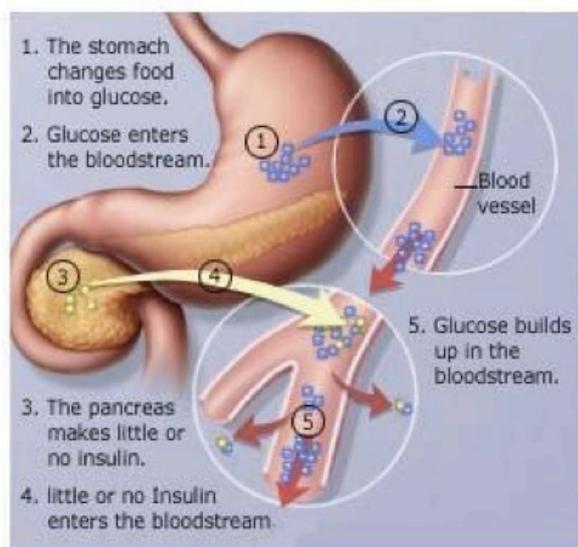
## Utilgjengelige

- Brytes ikke ned i tarmen, men "rydder" tarmen for avfallsstoffer
- Liten påvirkning på blodsukkeret
- For eksempel: grove kornprodukter, grønnsaker



## Blodsukker og insulin

1. Maten vi spiser går via magesekken til tarmen
2. Her brytes de tilgjengelige karbohydratene ned til enklere komponenter som tas opp og går over i blodet
3. Samtidig skilles insulin ut i blodet og hjelper karbohydratene inn i cellene
4. I cellene bidrar karbohydratene med energi til kroppen



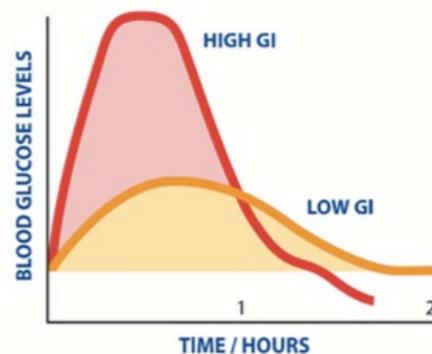
# Blodsukker og insulin

- Jo mer tilgjengelige karbohydrater det er i maten vi spiser, jo mer insulin skilles ut i blodet.
- Høyt blodsukker og insulinivå i blodet over lengre tid kan ha ugunstige helsekonsekvenser på sikt.
- Gir blant annet økt risiko for hjerte- og karsykdom, overvekt og diabetes type 2.



## Karbohydratenes påvirkning på blodsukkeret

- Måles med glykemisk indeks (GI) – et hjelpemiddel utviklet for diabetikere
- Matvarer med høy GI (f.eks sukker & hvitt mel): gir raske blodsukkersvingninger
- Matvarer med lav GI (f.eks grove kornprodukter): gir jevnt blodsukker



The amount of carbohydrate in the reference and test food must be the same.

## Helsemyndighetenes kostholdsråd

- Oppdaterte kostholdsråd - januar 2011
- Anbefaler et variert kosthold med mye frukt, grønnsaker, **grove kornprodukter**, samt et begrenset inntak av sukker, fett og rødt kjøtt.
- Anbefaler at karbohydrater skal utgjøre 50-60 % av det totale energiinntaket.



## Helsemyndighetenes kostholdsråd

1. Spis minst fem porsjoner grønnsaker, frukt og bær hver dag.
2. **Spis grove kornprodukter hver dag**
3. La magre meieriprodukter være en del av det daglige kostholdet.
4. Spis fisk til middag to til tre ganger i uken, bruk gjerne også fisk som pålegg.
5. Velg magre kjøtt og kjøttprodukter. Begrens mengden bearbeidet kjøtt og rødt kjøtt.
6. Velg matoljer, flytende margarin og myk margarin framfor hard margarin og smør.
7. **Velg matvarer med lite salt og begrens bruken av salt i matlagingen og på maten.**
8. Unngå mat og drikke med mye sukker til hverdags.
9. Velg vann som tørstedrikk.
10. Ha en god balanse mellom hvor mye energi du får i deg gjennom mat og drikke og hvor mye du forbruker gjennom fysisk aktivitet.



## Fedon Lindberg

- Bakgrunn som lege og indremedisiner.
- Anbefaler et kosthold basert på matvarer med lav glykemisk indeks (altså matvarer som påvirker blodsukkeret minst mulig)
- Det vil si et begrenset inntak av pasta, ris, poteter og fint brød.
- Har utviklet en egen produktserie (med blant annet brød og kornblanding)



# Lavkarbo-filosofien

- Robert Atkins - forkjemper for lavkarbo-kostholdet
  - Lege som behandlet overvektige og diabetespasienter med dietten
- Lavkarbo-kostholdet baserer seg på et minimum av karbohydrater, men mye fett og proteiner
- Kosthold basert på kjøtt, egg, grønnsaker, fete meieriprodukter, nøtter etc.
- Filosofien er basert på steinalderkostholdet → det de mener vi evolusjonsmessig er mest tilpasset å spise



## Våre tanker rundt brøddebatten

- Mye enighet mellom Fedon og helsemyndighetene.
- Fullt mulig å bake et brød med lav glykemisk indeks
- Lavkarbo-kostholdet er verken bærekraftig eller basert på tilstrekkelig vitenskapelig dokumentasjon.
- Korn befinner seg lavt i næringskjeden → gjør brød til et miljøvennlig matvalg.
- Brød er en viktig kilde til næringsstoffer i det norske kostholdet.



- Norsk kosthold

- For lite fiber
- For mye mettet fett
- For mye sukker
- For mye salt
- For lite vitaminer og mineraler

- Deres brød

- Mye fiber
- Lite mettet fett
- Lite sukker
- Lite salt
- Mye vitaminer (særlig B-vitamin) og mineraler (jern)



Hva mener DERE er et sunt brød?

## Dette er vårt forslag:

- 1 liter vann
- ¼ gjærpakke
- 1 ss salt
- 4 dl havregryn
- 1,5 dl linfrø
- 4 dl siktet hvetemel
- 4 dl sammalt hvete
- 6 dl grovmalt rug



# Brøddoppskriften er basert på:

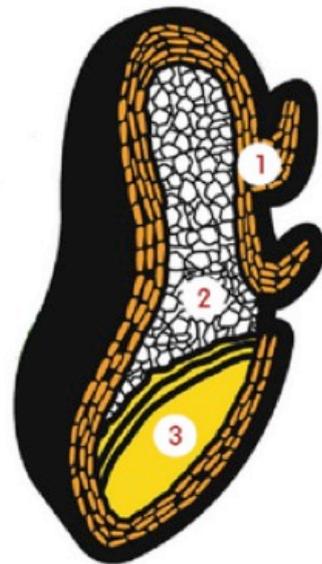
- Mye fullkorn
- Sunne frø
- Lite salt
- Mye vann
- Lite gjær
- Kaldheving



- → Faktorer som maksimaliserer brødets næringsinnhold og tilgjengeligheten av brødets næringsstoffer!

## Fullkorn

- Kornet består av tre deler:
  1. Kli: mye fiber, vitaminer, mineraler og antioksidanter
  2. Kjerne: mye lett tilgjengelige karbohydrater
  3. Kime: mye sunt fett
- Under malingen av kornet skilles kimen og klingen fra kjernen.
- Kjernen males til siktet mel.



# Fullkorn

- Sammalt mel inneholder alle bestanddelene av kornet (kime, kli og kjerne)
- Det vil si at man får i seg alt det sunne kornet har å by på: proteiner, sunt fett, fiber, vitaminer (B- og E-vitaminer) og mineraler (jern og selen) og antioksidanter



## Fullkorn og helseeffekter

- **Fullkorn forebygger:**
  - Hjerte-karsykdom
  - Kreft
  - Diabetes
  - Fordøyelsesbesvær



# Fullkorn og hjerte-karsykdom

- Fullkorn ”rydder” tarmen for kolesterol → lavere nivå av kolesterol i blodet
- Fullkornets mettende effekt → vektregulering
- Antioksidanter i fullkorn



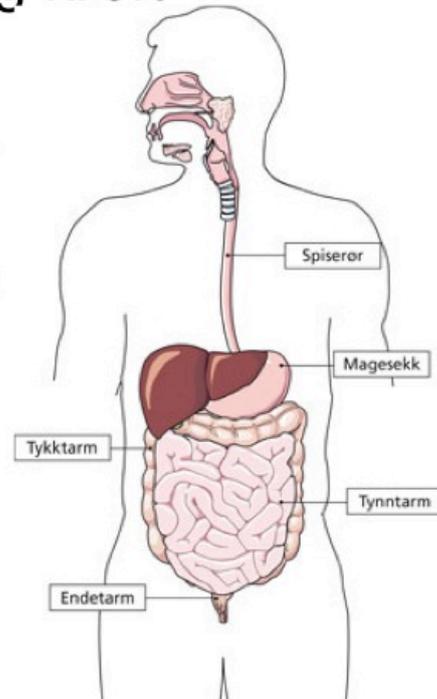
## Antioksidanter

- Skadelige stoffer dannes naturlig gjennom ulike prosesser i kroppen.
- Disse skadelige stoffene kan skade celler, proteiner og arvestoff.
- Antioksidantene er kroppens forsvar mot disse skadelige stoffene → forebygger sykdom.
- Fukt, bær, grønnsaker og korn er de viktigste antioksidantkildene i kostholdet vårt.



## Fullkorn og kreft

- **Fullkornets virkning:**
  - Kreftforebyggende vitaminer og mineraler
  - Sunne, kreftforebyggende fettsyrer dannes ved gjæring av fiber i tykktarmen
  - "Rydder" tarmen for kolesterol og kreftfremkallende avfallstoffer
  - Hurtigere passasje gjennom tarm
  - Antioksidanter i fullkorn



## Fullkorn og diabetes

- Fullkorn har en lav glykemisk indeks
- Gir senere absorpsjon i tarmen, som igjen gir lavere stigning av blodsukker- og insulinnivå
- Mettende effekt → unngår småspising mellom måltidene → vektregulering



## Fullkorn og fordøyelse

- Fullkorn trekker til seg vann på vei gjennom tarmen
- Øker volumet og hyppigheten på avføringen → forebygger forstoppelse



## Brødets melsammensetning

- Brøddoppskriften baserer seg på norske kornsorter (rug og havre) → bærekraftig
- Norske kornsorter som bygg, rug og havre øker brødets næringsverdi og skaper variasjon i kostholdet.
- Bygg og havre er rike på antioksidanter.
- Havre inneholder gunstige fettsyrer.



# Linfrø

- Frø og nøtter kan tilsettes brødet for å øke dets næringsmessige verdi
- Linfrø: god kilde til omega-3-fettsyrer, proteiner og fiber.
- God kilde til antioksidanter



# Vannmengde

- Senker brødets energiinnhold
- Viktig for brødets konsistens
- Gjør brødet saftig
- Øker brødets holdbarhet
- Mye vann gjør brødet mer mettende



## Gjærmengde og kaldheving

- Øker brødets innhold av B-vitaminer
- Kaldheving reduserer brødets innhold av fytat
  - Fytat hemmer opptaket av næringsstoffer (f. eks jern i tarmen)
- Dermed øker kroppens opptak av næringsstoffer fra brødet
- Bruk av lite gjær gir brødet en bedre smak



## Saltmengde

- De fleste nordmenn får i seg for mye salt fra maten
  - Rundt 10 gram per dag
  - Anbefalt mengde: 3-4 gram per dag
- For høyt saltinntak kan øke risikoen for høyt blodtrykk, hjerte-karsykdom og kreft
- Kan noen gjette hva som er den viktigste kilden til salt i det norske kostholdet?



# Saltmengde

- Kjøpebrød er en av hovedkildene til salt i det norske kostholdet
- Vårt brød inneholder lite salt:
  - Kjøpebrød: 0.42 gram natrium per 100 gram brød
  - Vårt brød: 0.22 gram natrium per 100 gram brød

Har dere sett disse merkene før?



Vårt brød oppfyller kravene til Nøkkelhullsmerket og får betegnelsen ekstra grovt på Brødskala' n.



## Nøkkelhullet

- Felles nordisk merkeordning – i Norge er Mattilsynet og Helsedirektoratet ansvarlige
- Frivillig merkeordning som skal gjøre det enklere for oss å velge sunt
- Matvarer merket med Nøkkelhullet inneholder:
  - Mindre og sunnere fett
  - Mindre sukker
  - Mindre salt
  - Mer kostfiber og fullkorn



Enkelt å velge sunnere

## Nøkkelhullsmerket brød

- Et brød merket med Nøkkelhullet inneholder per 100 gram:

- minst 25 % fullkorn
- minst 5 g fiber
- maks 7 g fett
- maks 5 g sukker
- maks 1,2 g salt



- Hvorfor er så få kjøpebrød merket med Nøkkelhullet?

Hvorfor får vårt brød Nøkkelhullet?

# Brødskala' n

- Brødskala' n skal gjøre det enklere å fastslå grovheten på brødet.
- Viser hvor mange prosent hele korn, sammalt mel og kli det er i brødet:
  - **Fint brød:** 0-25% sammalt mel eller hele korn
  - **Halvgrovt brød:** 25-50% sammalt mel eller hele korn
  - **Grovt brød:** 50-75% sammalt mel eller hele korn
  - **Ekstra grovt brød:** 75-100% sammalt mel eller hele korn
- Brødskalakalkulator:  
<http://www.brodogkorn.no/brodskala-kalkulatoren/>

**Velg grove brød og kornvarer!**  
- anbefalt inntak av fiber: 25-35 g per dag



The image shows three stacks of bread slices. The first stack is labeled 'FINT' and consists of three slices of white bread. The second stack is labeled 'HALVGROVT' and consists of four slices of light brown bread. The third stack is labeled 'EKSTRAGROVT' and consists of four slices of dark brown, whole grain bread. Each stack has a red circular logo with a white cross and the text 'Brødskala'n' around it.

<b>Fiberinnhold:</b> 2 brødsiver: 1,6 g 4 brødsiver: 3,2 g	<b>Fiberinnhold:</b> 2 brødsiver: 3,4 g 4 brødsiver: 6,8 g	<b>Fiberinnhold:</b> 2 brødsiver: 5,2 g 4 brødsiver: 10,4 g
--	--	---

## Dagens quiz

- Hvilket brød er grovest?



## Hvorfor bør du bake brødet ditt selv?

- Helsemessige årsaker
- Unngå tilsetningsstoffer
- Miljøhensyn
- Hverdagsaktivitet
- Tid
- Økonomi



# Butikkbrød

- Utbredt bruk av tilsetningsstoffer i brødindustrien



- Storskalaproduksjon, økonomi, samt forbrukernes forventninger



# Kjøpebrød

- **Industrien bruker tilsetningsstoffer for å:**
  - Styrke deigen slik at den bedre tåler maskinbearbeiding
  - Øke deigvolumet – gir større brød
  - Bedre brødets symmetri
  - Gi mykere brød
  - Redusere hevetiden – "tid er penger"
  - Øke brødets holdbarhet – forsinke fordervelsesprosessen (**brukes 16 forskjellige stoffer bare for å få brødet til å virke ferskt!**)

## Ved å bake brødet ditt selv...

- **Slipper du:**
  - ...unødvendige tilsetningsstoffer fra butikkbrød
  - ...å få i deg for mye salt fra brød
  - **Med andre ord: full kontroll på hva du får i deg!**



## Miljøhensyn

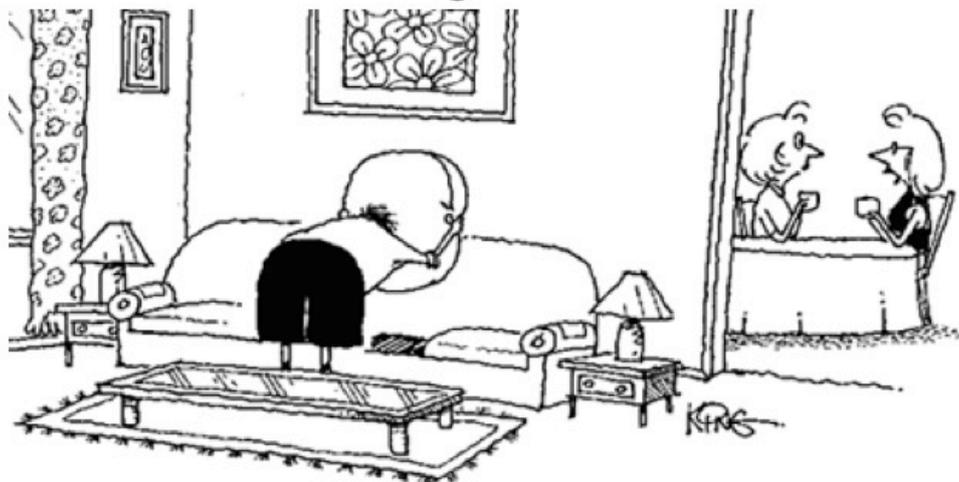
- Bake selv: lite energikrevende produksjon. Ingen avstand mellom produsent og forbruker
- Bake selv: kan velge lokale kornsorter (f. eks. bygg, rug, havre) og økologisk mel



## Hverdagsaktivitet

- Hverdagen preges av stadig mer stillesitting
  - Vi sitter på jobb/skole, i bilen, hjemme foran TV og PC...
- Hverdagsaktivitet (som det å bake) kan være et viktig bidrag for økt aktivitet
- Ofte er det lite som skal til!

## Hverdagsaktivitet



The doctor said he needed more activity. So I hide his T.V. remote three times a week.

## Oppskriften er lett vint og lite tidkrevende

- **Du slipper...**
  - ...å varme opp vannet når du baker
  - ...å vente på at deigen skal før- og etterheve
  - **Med andre ord: masse tid spart!**



## Billig

- |                              |                            |
|------------------------------|----------------------------|
| • <u>Butikkbrød</u>          | • <u>Hjemmebakt brød</u>   |
| – Byggbrød 35,-              | – Mel 6,5,-                |
| – Havrebrød 29,-             | – Havregryn 2,0,-          |
| – Speltbrød 28,-             | – Gjær 0,25,-              |
| – Vita hjertego' 33,-        | – Linfrø 2,5,-             |
| – <b>Gj.snitt: X kr/brød</b> | – <b>Sum 11,25 kr/brød</b> |
- 
- |   |  |
|---|--|
| • 1 brød/uke i ett år:<br><b><u>1872 kr</u></b> | • 1 brød/uke i ett år:<br><b><u>572 kr</u></b> |
|---|--|

## Differanse: 1300 kroner!

- **For dette kan du få:**

- Dekket lisensavgiften for et halvt år

- 552 doruller

- Nye joggesko

- 100 liter bensin



## Oppsummert: hva er bra med å bake brød selv?

- Mye fullkorn
- Lite salt
- Næringsrikt og kalorifattig brød
- Smakfullt brød
- Kontroll på hva du får i deg
- Spare penger
- Miljøvennlig
- Hverdagsaktivitet



# Spørsmål?

- Line Jensen: Tlf: 41 45 82 91, [s270586@stud.hioa.no](mailto:s270586@stud.hioa.no)
- Kjersti Lilleberg: Tlf: 92 60 34 43, [s270621@stud.hioa.no](mailto:s270621@stud.hioa.no)



UNIVERSITETET I AGDER



HØGSKOLEN I OSLO  
OG AKERSHUS

Læringscenter  
og bibliotek

# MITT BRØDBAKINGSHEFTE

## *Brøddoppskrift*

**1 liter vann**

**--- gjær**

**1 spiseskje salt**

**4 dl havregryn**

**1,5 dl linfrø**

**4 dl siktet hvetemel**

**4 dl sammalt hvete**

**6 dl grovmalt rug**



# DAG 1



**Trinn 1.** Finn fram alle ingredienser og mål opp riktige mengder.

**Trinn 2.** Rør ut gjæren i det kalde vannet til gjæren er oppløst.



**Trinn 3.** Bland inn de øvrige ingrediensene og elt deigen godt.

**Trinn 4.** Dekk bollen med plastfolie og sett den i kjøleskapet. La deigen stå til neste dag.



# DAG 2

**Trinn 5.** Sett ovnen på 200°C. Fordel deigen i to brødformer.



**Trinn 6.** Når ovnen er varm settes brødene på rist på nederste rille i ovnen. La brødene steke i cirka en time. Dersom brødene underveis i steketiden begynner å bli mye stekt på overflaten bør et bakepapir legges over brødene.

**Trinn 7.** Ta brødene ut av ovnen og formene. For å forsikre deg om at brødene er ferdig stekt, snu de og bank lett i brødet. Dersom du hører en hul lyd, er brødene klare.



**Trinn 8.**

Avkjøl brødene på rist. Det er viktig at brødene avkjøles godt og lenge før du skjærer i dem.



**Lykke til!**



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## SPØRRESKJEMA 2



Dette spørreskjemaet er en del av brødbakingsprosjektet som du er deltager i. Du vil bli bedt om å besvare totalt tre spørreskjemaer – dette er det andre av de tre. Utfyllingen vil ta rundt ti minutter. Resultatene fra prosjektet vil kun bli brukt til vitenskapelige formål. All informasjon er anonymisert - vennligst ikke skriv ditt navn noe sted i skjemaet. Det er ingen rette eller gale svar.

### Hvordan skal du besvare spørreskjemaet?

- Bruk blå eller svart penn.
- Svar med et tydelig kryss.
- Sett kun et kryss per spørsmål (noen få spørsmål skal besvares med ord)
- 

### Takk for hjelpen!

Ved spørsmål, ta kontakt: Line Jensen: Tlf: 41 45 82 91,  
[s270586@stud.hioa.no](mailto:s270586@stud.hioa.no)

Kjersti Lilleberg: Tlf: 92 60 34 43,  
[s270621@stud.hioa.no](mailto:s270621@stud.hioa.no)

**1. ID-nummer:**

**2. Hva er din alder?**

\_\_\_\_\_ år

**3. Hva er din høyest fullførte utdanning?**

- Grunnskole (barneskole og ungdomsskole)
- Videregående skole (allmennfaglig eller yrkesfag)
- Høgskole/Universitet (3-4 år - tilsvarende cand.mag eller bachelorgrad)
- Høgskole/Universitet (5 år eller mer - tilsvarende hovedfag, master eller phd)

**4. Hvilken dag er det i dag?**

- Mandag
- Tirsdag
- Onsdag
- Torsdag
- Fredag
- Lørdag
- Søndag

**BRØDVANER**

**5. Hvor mange brødkiver spiser du gjennomsnittelig i løpet av en dag?**

Antall brødkiver: \_\_\_\_\_

**6. Hvor mange brødkiver spiste du i går?**

Antall brødkiver: \_\_\_\_\_

**7. Hva slags brød spiser du vanligvis?**

- Fint
- Halvgrovt
- Grovt
- Svært grovt

**8. Hvor kommer vanligvis brødet fra?**

- Hjemmebakt
- Dagligvarebutikk
- Bakeri
- Annet

**9. Hvor ofte baker du vanligvis brød i løpet av en periode på 14 dager?**

Antall ganger: \_\_\_\_\_

**10. Hvor ofte bakte du brød i løpet av de siste 14 dagene?**

Antall ganger: \_\_\_\_\_

**11. Bakte du brød i går?**

- Ja
- Nei

**BRØDKUNNSKAP**

**12. Hva er Nøkkelhullskriteriet for brød? Beskriv med egne ord.**

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**13. Hva indikerer tre kaker på Brødskala'n? Beskriv med egne ord.**

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**14. Hvordan vurderer du dine kunnskaper om brødets påvirkning på helsen?**

- Svært gode
- Gode
- Verken gode eller mangelfulle
- Mangelfulle
- Svært mangelfulle

### **FAKTORER SOM PÅVIRKER BRØDBAKING**

**15. Jeg er motivert til å bake mitt eget brød.**

- Helt enig
- Litt enig
- Verken enig eller uenig
- Litt uenig
- Helt uenig

**16. Jeg mestrer å bake brød selv.**

- Helt enig
- Litt enig
- Verken enig eller uenig
- Litt uenig
- Helt uenig

**17. Jeg har tid til å bake brød selv.**

- Helt enig

- Litt enig
- Verken enig eller uenig
- Litt uenig
- Helt uenig

### TV- OG PC-VANER

**18. Omtrent hvor mange timer om dagen ser du vanligvis på TV/DVD på fritiden?** (Fyll ut et felt for hverdager og et for helgedager).

**a) Hverdager**

- Ingenting
- Mindre enn 30 min/dag  
min/dag
- 30 min/ dag
- 1 time/dag
- 1 time og 30 min/dag  
min/dag
- 2 timer/dag
- 2 timer og 30 min/dag  
min/dag
- 3 timer/dag
- 3 timer og 30 min/dag  
min/dag
- 4 timer eller mer/dag  
mer/dag

**b) Helgedager**

- Ingenting
- Mindre enn 30  
min/dag
- 30 min/ dag
- 1 time/dag
- 1 time og 30  
min/dag
- 2 timer/dag
- 2 timer og 30  
min/dag
- 3 timer/dag
- 3 timer og 30  
min/dag
- 4 timer eller  
mer/dag

**19. Omtrent hvor mange timer så du på TV/DVD i går?**

- Ingenting

- Mindre enn 30 min/dag
- 30 min/ dag
- 1 time/dag
- 1 time og 30 min/dag
- 2 timer/dag
- 2 timer og 30 min/dag
- 3 timer/dag
- 3 timer og 30 min/dag
- 4 timer eller mer/dag

**20. Omtrent hvor mange timer om dagen sitter du foran PC-en på fritiden?** (Fyll ut et felt for hverdager og et for helgedager).

**a) Hverdager**

- Ingenting
- Mindre enn 30 min/dag  
min/dag
- 30 min/ dag
- 1 time/dag
- 1 time og 30 min/dag  
min/dag
- 2 timer/dag
- 2 timer og 30 min/dag  
min/dag
- 3 timer/dag
- 3 timer og 30 min/dag  
min/dag
- 4 timer eller mer/dag  
mer/dag

**b) Helgedager**

- Ingenting
- Mindre enn 30
- 30 min/ dag
- 1 time/dag
- 1 time og 30
- 2 timer/dag
- 2 timer og 30
- 3 timer/dag
- 3 timer og 30
- 4 timer eller

**21. Omtrent hvor mange timer satt du foran PC-en går?**

- Ingenting
- Mindre enn 30 min/dag
- 30 min/ dag
- 1 time/dag
- 1 time og 30 min/dag
- 2 timer/dag
- 2 timer og 30 min/dag
- 3 timer/dag
- 3 timer og 30 min/dag
- 4 timer eller mer/dag

## EVALUERING AV KURSET

### **22. Alt i alt, hvordan likte du brødbakingskurset?**

- Svært godt
- Godt
- Verken godt eller dårlig
- Dårlig
- Svært dårlig

### **23. Hvordan likte du selve foredraget?**

- Svært godt
- Godt
- Verken godt eller dårlig
- Dårlig
- Svært dårlig

### **24. Hvordan likte du selve brødbakingen?**

- Svært godt
- Godt
- Verken godt eller dårlig
- Dårlig
- Svært dårlig

### **25. Hvor godt likte du brødet som ble bakt på kurset?**

- Svært godt
- Godt
- Verken godt eller dårlig
- Dårlig
- Svært dårlig

**26. Hvor relevant synes du foredraget var for deg?**

- Svært nyttig
- Nyttig
- Verken nyttig eller unyttig
- Lite nyttig
- Svært lite nyttig

**27. Hvor relevant synes du brødbakingen var for deg?**

- Svært nyttig
- Nyttig
- Verken nyttig eller unyttig
- Lite nyttig
- Svært lite nyttig

**28. Hvor stort utbytte føler du at du har hatt av kurset?**

- Stort utbytte
- Noe utbytte
- Verken eller
- Lite utbytte
- Svært lite utbytte

**29. Det var enkelt å bake to ganger i uka.**

- Helt enig
- Litt enig
- Verken enig eller uenig
- Litt uenig
- Helt uenig

**30. Hvordan eltet du vanligvis brøddeigen?**

- For hånd
- Med maskin

**31. Kurset var tydelig på hva som er et sunt brød.**

- Helt enig
- Litt enig
- Verken enig eller uenig
- Litt uenig
- Helt uenig

**32. Selve brøddoppskriften var enkel å lære seg.**

- Helt enig
- Litt enig
- Verken enig eller uenig
- Litt uenig
- Helt uenig

**Var noe uklart under kurset. I så fall, hva?**

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**Har du forslag til forbedringer av kurset? Beskriv.**

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**Andre kommentarer?**

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**TUSEN TAKK FOR HJELPEN 😊**

## Attachment 6, NSD approval letter

Norsk samfunnsvitenskapelig datatjeneste AS  
NORWEGIAN SOCIAL SCIENCE DATA SERVICES



Harald Hårfagres gate 29  
N-5007 Bergen  
Norway  
Tel: +47-55 58 21 17  
Fax: +47-55 58 96 50  
nsd@nsd.uib.no  
www.nsd.uib.no  
Org nr. 985 321 884

Elling Bere  
Institutt for helse, ernæring og ledelse  
Høgskolen i Oslo og Akershus  
Postboks 423  
2001 LILLESTRØM

Vår dato: 13.09.2011

Vår ref: 27822 / 3 / MSS

Deres dato:

Deres ref:

### KVITTERING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 24.08.2011. All nødvendig informasjon om prosjektet forelå i sin helhet 13.09.2011. Meldingen gjelder prosjektet:

27822	Brudbakingsintervensjonen
Behandlingsansvarlig	Høgskolen i Akershus, ved institusjonens øverste leder
Daglig ansvarlig	Elling Bere
Student	Line Jensen

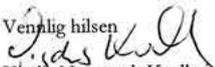
Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstiller kravene i personopplysningsloven.

Personvernombudets vurdering forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i melde skjemaet, korrespondanse med ombudet, eventuelle kommentarer samt personopplysningsloven/-helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, [http://www.nsd.uib.no/personvern/forsk\\_stud/skjema.html](http://www.nsd.uib.no/personvern/forsk_stud/skjema.html). Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://www.nsd.uib.no/personvern/prosjektoversikt.jsp>.

Personvernombudet vil ved prosjektets avslutning, 30.06.2012, rette en henvendelse angående status for behandlingen av personopplysninger.

Venlig hilsen  
  
Vigdis Nantvedt Kvalheim

  
Marie Strand Schildmann

Kontaktperson: Marie Strand Schildmann tlf: 55 58 31 52  
Vedlegg: Prosjektvurdering  
Kopi: Line Jensen, Finnerudveien 17, 3041 DRAMMEN

Avdelingskontorer / District Offices:

OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. [nsd@uio.no](mailto:nsd@uio.no)  
TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. [kyrre.svarva@svt.ntnu.no](mailto:kyrre.svarva@svt.ntnu.no)  
TROMSØ: NSD, HSL, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. [martin-arnie.andersen@uit.no](mailto:martin-arnie.andersen@uit.no)

## Forespørsel om deltagelse på brødbakingskurs

Vi er to masterstudenter i Mat, helse og ernæring ved Høgskolen i Oslo og Akershus. Det kommende året skal vi skrive vår masteroppgave. Det er i denne sammenheng vi ønsker kontakt med deg.

### Bakgrunn og hensikt

Brød er en av de mest omdiskuterte matvarene for tiden. Samtidig som enkelte mener at vi klarer oss best uten brød, anbefaler norske helsemyndigheter grovt brød som en viktig del av det daglige kostholdet. Butikkene tilbyr et bredt spekter av ulike typer brød og mange aktører hevder at de har funnet oppskriften på det ”perfekte” brødet, for eksempel Ingers rugbrød, Fedon Lindbergs lavkarbobrød og Grete Roede-brødet. Men hvem har egentlig rett? Hva er egentlig det ”perfekte” brødet?

Til tross for at nordmenn har mer fritid i dag enn tidligere lager Ola og Kari Nordmann stadig mindre mat fra bunnen av. Siden brød utgjør en stor del av det norske kostholdet, og det for de aller fleste vil fortsette å gjøre det, kan det å bake sitt eget brød være betydningsfullt for manges helse. Ikke bare ernæringsmessig, men også når det gjelder fysisk aktivitet og stillesitting. Mangelen på hverdagsaktiviteter (slik som det å bake brød) i det moderne samfunnet er en av flere mulige årsaker til den overvektsepidemien vi ser i dag.

Det kan være mange grunner til at vi ikke baker vårt eget brød. Mangel på kunnskap, ferdigheter og tid kan være blant disse. Vår hensikt med dette forskningsprosjektet er å undersøke om vi kan få deg til å begynne å bake ditt eget brød! Du inviteres med dette på et brødbakingskurs der du får kunnskap og ferdigheter om helse, brød og brødbaking, samt blir presentert for ”oppskriften” på det optimale brødet. Dette brødet vil være både sunnere og smake bedre enn de fleste brød du har smakt, samtidig som det vil oppleves som lettvinnt og lite tidskrevende å bake. Kanskje du også slutter å kjøpe brød i butikken?

Prosjektet er et samarbeid mellom Universitetet i Agder og Høgskolen i Oslo og Akershus og vil bli gjennomført høsten 2011.

### Hvem søker vi?

Vi søker kvinner og menn i alle aldre som ikke baker brød regelmessig, som ikke har cøliaki og som for tiden ikke deltar i vektreduksjonsprogrammer (som for eksempel Grete Roede).

### Hva innebærer prosjektet?

Dette prosjektet utgjør et brødbakingskurs som har en total varighet på rundt tre timer fordelt på to dager. Kurset vil innebære både praktisk arbeid og nyttig informasjon om helse, brød og brødbaking.

Du vil også bli bedt om å besvare et kort spørreskjema ved 3 anledninger. Spørreskjemaene inkluderer spørsmål om brød- og bakevaner, kosthold, fysisk aktivitet og stillesitting.

Deltagelse i prosjektet forutsetter at du må bake brød på egenhånd to ganger per uke de påfølgende to ukene etter kursslutt. Til dette vil du få utdelt alt nødvendig utstyr, samt alle nødvendige ingredienser.

All deltagelse er gratis.

#### **Hva krever en eventuell deltagelse av deg?**

- Oppmøte på brødbakingskurs to ganger
- Besvarelse av tre spørreskjemaer
- Å bake brød på egenhånd minst fire ganger

#### **Hva skjer med informasjonen som kommer frem?**

Opplysningene som kommer frem fra spørreskjemaene vil bli behandlet uten navn eller andre gjenkjennbare opplysninger. Behandlingen av dataene vil således aidentifiseres og dermed ikke kunne spores tilbake til den enkelte person. Dataene vil bli slettet umiddelbart etter prosjektets slutt 30.06.2012.

#### **Frivillig deltagelse**

Det er frivillig å delta i prosjektet. Du kan når som helst og uten å oppgi grunn velge å trekke deg fra prosjektet. Alle data om deg vil da bli slettet. Dersom du ønsker å delta, undertegner du samtykkeerklæringen under. Om du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke.

Dersom du har spørsmål om prosjektet kan du kontakte oss eller vår veileder:

Masterstudent Line Jensen:	Tlf: 41 45 82 91, <a href="mailto:s270586@stud.hioa.no">s270586@stud.hioa.no</a>
Masterstudent Kjersti Lilleberg:	Tlf: 92 60 34 43, <a href="mailto:s270621@stud.hioa.no">s270621@stud.hioa.no</a>
Veileder Elling Bere:	Tlf: 38 14 23 29, <a href="mailto:elling.bere@uia.no">elling.bere@uia.no</a>

Håper du har lyst til å delta og at vi sees på brødbakingskurs i høst!

## **Samtykke til deltagelse i prosjektet**

- Ja, jeg har lest informasjonsskrivet og forstått hva prosjektet innebærer.
- Ja, jeg ønsker å delta

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(Signert av prosjektdeltager, dato) Bruk blokkbokstaver!