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Challenges in primary prevention of allergy

The Prevention of Allergy among Children in Trondheim (PACT) study

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Contents

Summary in Norwegian

Utfordringer i primærforebygging av allergisk sykdom

Barneallergistudien i Trondheim

Det har vært en betydelig økning i forekomsten av allergiske sykdommer som astma, høysnue og eksem blant barn de siste 30-40 år. Forekomsten av luftveisplager og atopi blant barn i Aberdeen har blitt undersøkt med spørreskjema gjennom 35 år. Fra 1964 til 1999 økte forekomsten av astma (noen gang) fra 4% til 24%, for eksem økte forekomsten av eksem (noen gang) fra 5% til 21% og for høysnue økte forekomsten fra 3,2% til 15% for skolebarn(Devenny et al. BMJ 2004;329:489-490).
Stortingsmelding nr. 118-1993-94 omhandlet denne økningen og forebygging av allergiske sykdommer ble et forskningsmessig satsningsområde. På bakgrunn av dette tok Trondheim kommune i samarbeid med SINTEF Unimed i 1997 initiativet til et prosjekt for primærforebygging av allergiske sykdommer, Barneallergistudien i Trondheim. Under forutsetning av at prosjektet var gjennomførbart og hadde nasjonal overføringsverdi ga Sosial- og Helsedirektoratet økonomisk støtte til prosjektet. NTNU ved Institutt for samfunnsmedisin fikk i oppdrag å gjennomføre evaluering av effektiviteten og effekten av intervensjonstiltakene.
Hovedhensikten med PACT-studien var å studere hvor effektivt (endret deltakerne atferd) det er å intervenere på tre antatte risikofaktorer for allergisk sykdom i en uselektert populasjon av gravide kvinner og små barn. Videre å se om endret risikoatferd fører til endret forekomst av astma og allergisk sykdom ved:

- Økt inntak av Omega-3-fettsyrer og fet fisk
- Redusert eksponering for tobakksrøyk under svangerskapet og barnets 2 første leveår
- Redusert fukt i inneklima under svangerskapet og barnets 2 første leveår.

Mål

Det er mange utfordringer knyttet til gjennomføring og evaluering av et slikt prosjekt og målsettingen med denne avhandlingen var å studere om:

- Intervensjon mot risikofaktorer for allergisk sykdom hos små barn, innenfor rammen av ordinær primærhelsetjeneste, førte til endring i atferd og dermed eksponering.
- Intervensjon mot røyking under svangerskapet hadde effekt på røykeatferd.
- Spørsmålene brukt til å bestemme forekomsten av allergisk sykdom hos små barn var pålitelige.
- Inntak av tran og fet fisk under svangerskapet og i barnets første leveår forebygget foreldrerapportert eksem og legediagnostisert astma hos toåringer.

Metode

For å gjennomføre evalueringen ble det opprettet en hovedstudie med en kontrollkohort av gravide og barn som fikk den vanlige oppfølging og datidens råd i primærhelsetjenesten og en intervensjonskohort (tiltaksgruppe) som fikk den nye systematiserte veiledningen. Inklusjon til intervensjonskohorten startet juni 2002 og alle gravide og småbarnsforeldre i Trondheim kommune skulle får den samme rettledningen enten de deltok i studien eller ikke. Kontrollkohorten ble etablert i perioden fra høsten 2000 til mai 2002.
Formålet med kontrollkohorten var å følge utvikling av prevalens av risikofaktorer og

insidens av allergisk sykdom. Deltakerne besvarte spørreskjema under svangerskapet, 6 uker etter fødselen og når barnet var 1 og 2 år gammelt.

Resultat

Diettintervensjonen lyktes, inntaket av tran og fet fisk økte både under svangerskapet og i barnets 2 første leveår i intervensjonskohorten sammenliknet med kontrollkohorten, mens vi ikke fant noen forskjell mellom kohortene i matslag vi ikke intervenerte på. Vi observerte en betydelig redusert nedgang i røyking i intervensjonskohorten sammenliknet med kontrollkohorten. Tidstrenden for røykeslutt i studieperioden gikk i samme retning i begge kohorter, og nedgangen i røykeforekomst kunne derfor ikke tilskrives intervensjonen. Vi fant heller ingen effekt av røykeintervensjonen under svangerskapet på de kvinner som fortsatt røykte ved inklusjon i studien. Vi observerte imidlertid en betydelig høyere spontan røykeslutt ved svangerskapets start i Trondheim sammenliknet med Bergen og hele Norge når vi sammenliknet tall fra Medisinsk fødselsregister.

Spørsmålene vi brukte til å bestemme forekomsten av allergisk sykdom blant 2 åringer var pålitelige, og ingen av spørsmålene overestimerte forekomsten av allergisk sykdom.

Inntak av tran og fet fisk under svangerskapet viste ingen sammenheng med rapportert eksem eller legediagnostisert astma ved 2 års alder. Inntak av tran første leveår viste heller ikke sammenheng med allergisk sykdom ved 2 års alder. Inntak av fisk derimot, og spesielt inntak av feit fisk ved 1 års alder en gang i uken eller mer sammenliknet med de som spiste fikk mindre enn en gang i uken viste en sterk beskyttende på rapportert eksem ved 2 års alder.

Konklusjon

Intervensjonstiltak for å endre atferd for å redusere risikofaktorer for allergisk sykdom i primærhelsetjenesten lar seg gjennomføre, men det er noen begrensinger. Risikofaktorer helsearbeiderne var vant til å arbeide med, som kost lot seg endre, mens et ukjent tema som fukt i boliger ikke lot seg endre. Røykeslutt ved svangerskapets start var svært vanlig, og de som ikke sluttet spontant lot seg ikke påvirke av våre intervensjonstiltak. For å få de som ikke slutter spontant å røyke ved svangerskapets start, ser det ut til at det må utvikles nye røykesluttstrategier. Røykeintervensjonen i PACT studien kan på makroplan ha bidratt til at en høyere andel av gravide sluttet å røyke i Trondheim sammenliknet med Bergen, muligens ved at studien har forsterket de nasjonale røykesluttkampanjene. Spørreskjemaet vi utviklet for å måle forekomst av allergiske sykdommer var pålitelig. Fisk, men ikke tran gitt det første leveår beskytter mot eksem ved 2 års alder. Vår hypotese er at det kan være andre allergibeskyttende faktorer i fisk enn omega-3 fettsyrer, som enten virker alene eller sammen med fettsyrene med hensyn til å beskytte mot eksem, og våre funn rettferdiggjør søken etter slike faktorer.

Abbreviations

aOR	Adjusted Odds Ratio
ARC	Allergic rhinoconjunctivitis
ARIA	Allergic Rhinitis and its Impact on Asthma
CI	Confidence interval
EAACI	European Academy of Allergy and Clinical Immunology
GINA	Global Initiative for Asthma
GP	General Practitioner
IgE	Immunoglobulin E (antibody subclass of capable of triggering immune reactions)
ISAAC	International Study of Asthma and Allergies in Childhood
MBR	Medical Birth Register
PUFA	Poly Unsaturated Fatty Acid
NTNU	Norwegian University of Science and Technology
OR	Odds Ratio
PACT study	The Prevention of Allergy among Children I n Trondheim Study
SHS	Second Hand Smoke
SINTEF	The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology
SINTEF Unimed	The health research group in SINTEF
SPSS®	Statistical Package for the Social Sciences
Stata®	Stata is a general-purpose statistical software package created in 1985 by StataCorp

Why did I as a GP start researching, and why did I choose allergic disease?

In my work as a general practitioner, working at a health care centre for small children and as a doctor for school children from 1986, a large proportion of my patients have been children. During the first decade of my practice as a GP, from 1986 to 1996, allergic diseases increased dramatically in prevalence. Children with allergic rhinitis, dermatitis and asthma were a common challenge in my daily practice, and over the years the interest in this field flourished.

I took part in several drug trials, in some of them as principal investigator. During this work the first sparks were lit for this research. When the daughter of a good friend of mine developed very severe asthma I even became more interested in this field. I became active in arranging postgraduate courses for colleagues and also took part in a project regarding patient education for asthmatics.

When the Prevention of Allergy among Children in Trondheim (PACT) study was initiated, as a joint venture between the Municipality of Trondheim and SINTEF Unimed, I was invited to participate in the planning of the study. During this process I faced the challenge of taking part in the evaluation of the project. I did not want to leave my work as a GP; I wanted to combine general practice and academic work. However, the planned intervention study was very large, comprising 3000 pregnant women and some 17 000 controls, so this was not a part-time job. Subsequently I approached my esteemed colleague, Ola Storrø, and together we applied for a university scholarship and the ball started rolling...

Acknowledgements

The PACT study started as a collaboration between SINTEF Unimed, the Municipality of Trondheim and the Norwegian University of Science and Technology (NTNU). It was possible to perform this study thanks to this collaboration and the contributions of a large number of co-workers. Jon A. Jenssen at SINTEF Unimed was very central in the initiation process of the study and I would like to acknowledge the work he did during this process. I would like to thank all the persons who have worked in the PACT study, especially Guri Helmersen and Else Bartnes. They have done an excellent job in collecting, storing and systematising data. I would also thank all the pregnant women and parents in Trondheim who have participated in the PACT study for their conscientious contribution for research by repeatedly answering questionnaires.
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List of papers

Paper I

Storrø O, Øien T, Dotterud CK, Jenssen JA, Johnsen R. A primary health-care intervention on pre- and postnatal risk factor behavior to prevent childhood allergy.

The Prevention of Allergy among Children in Trondheim (PACT) study. *Submitted*

Paper II

Øien T, Storrø O, Johnsen R. The impact of a minimal smoking cessation intervention for pregnant women and their partners on perinatal smoking behaviour in primary health care: A real-life controlled study. *BMC Public Health 2008, 8:325*

Paper III

Øien T, Storrø O, Johnsen R. Assessing atopic disease in children two to six years old: Reliability of a revised questionnaire. *Prim Care Respir J. 2008 17(3);164-8*

Paper IV

Øien T, Storrø O, Johnsen R. Do early intake of fish and fish oil protect against eczema and doctor-diagnosed asthma at 2 years of age? A cohort study.

J Epidemiol Community Health. Published Online First: 6 August 2009. doi:10.1136/jech.2008.084921

Introduction – the history of PACT

The Municipality of Trondheim has shown a considerable interest towards and motivation to invest in prophylactic measures for the benefit of children and youth in general. Both on a political and administrative level, the attitude of the local authority was positive to a major scientific investigation on allergic diseases such as asthma, eczema and allergic rhinoconjunctivitis (ARC). Without the investment in infrastructure made by the municipality of Trondheim, a project like the PACT study would have been difficult to accomplish.

In spring 1997, representatives from the Municipality of Trondheim and SINTEF Unimed had a meeting with the Social and Health Ministry in Norway, exploring the possibility of establishing an action plan for primary prevention on allergic and indoor-climate diseases among children in Trondheim. The Ministry supported the planning and establishment of this project from 1997 to 1999. The Ministry concluded that the project had the potential to reach results of general national value, and pronounced an intention to support the accomplishment of the project with funding of the project's organisation.

From autumn 1998 the project was organised by an interdisciplinary working party and a steering committee with representatives from the research group and the city council. It soon became evident that evaluating changes in prevalence and incidence of allergic diseases demanded interventions directed towards pregnant women and children up to 2 years of age.

The Municipality considered it important for the project to have a solid political affiliation. From 1998 an "ad hoc" municipal committee worked on this, concluding with a "Health Promoting Plan for Children and Youth in Trondheim". This plan received general political acceptance, and made it possible to find financial support for projects within the scope of this plan. The PACT study was one of the first specific projects to fall within the framework of this enterprise.

The Municipality of Trondheim was already giving advice and information to parents on risk factors for developing asthma and allergy and this was already one of the high priority topics. Some maternity clinics had started smoking cessation groups, but had to

terminate these due to the small number of participants. The community considered the PACT study a good opportunity to develop the contents of existing guidelines to improve ongoing interventions on assumed risk factors for allergic diseases. In the process of developing methods and the new guidelines, there was a close collaboration between the maternity clinics, primary physicians, midwifes, SINTEF Unimed and NTNU using a Delphi technique[1]. The guidelines should at best be evidence based. A multi-behavioural intervention programme was developed targeting reduced tobacco exposure, increased intake of oily fish and n-3 polyunsaturated fatty acids (n-3 PUFAs) and reduced housing dampness during pregnancy and infancy. There was sparse documentation on the effectiveness of specific strategies for implementing life-style interventions in ordinary primary health care. When new guidelines regarding prophylaxis and treatment of disease are considered, a preceding investigation and evaluation of the implementation programme and how it may change behaviour in a real-life setting provides important knowledge to health professionals, decision-makers and politicians. Thus a research group from the Department of Public Health and General Practice was set to evaluate the efficacy of the new intervention programme.

1 Background

General

To understand the substantial increase in asthma, allergy and atopic eczema among children in the industrialised world, studies considering both genetic and environmental factors influencing the risk of atopy combined with investigations on underlying mechanisms are needed[2,3].

The increase has been most evident among children without a former known genetic predisposition for atopic disease[4]. The observed substantial difference in prevalence between populations of equal age and ethnicity in many parts of the world indicates the importance of environment and living conditions. It is reasonable to assume that either new environmental factors that provoke atopic sensitisation have emerged, or potentially protective factors have been lost[2,5]. Besides, there are obvious associations between age, exposure and disease penetration, hinting at different vulnerability for the same exposure depending on the actual living conditions when the child is exposed[6].

The ISAAC study (see below, 6.3.5) has documented evident variation in disease prevalence between east and west, rural and urban areas, the poor and the rich[5,7]. The risk factors investigated so far do not have a geographic or socio-economic presence to explain these differences in allergy prevalence. This necessitates a search for new or lost environmental factors, distributed in a way that can explain these variations in disease prevalence[2,5,8,9]. An increased understanding of the immunological basis for allergic disease has formed a basis for investigating several new environmental factors[10]. In addition to the fact that environmental factors have an impact on incidence changes in individuals with different predisposition for allergic disease, the morbidity depends on the age of the individual when the exposure takes place[11].
In the PACT study three separate environmental factors that have been assumed to be causally related to allergy incidence are investigated:

- Second-hand smoke (SHS)
- Dietary intake of n-3 PUFAs and oily fish
- Indoor dampness.

A literature search was conducted for the validity and reliability of questionnaires on atopy and allergy among children (Medline and Cochrane search). Most of the existing literature was concerned with variations of ISAAC. However, ISAAC was constructed for and applies to older children, not children at aged 2 years. To evaluate the effectiveness of the intervention, existing questionnaires from the ISAAC protocol[12] had to be revised for the actual age group.

The rest of this section will address; the definitions, prevalence, and risk factors for allergic diseases, the rationale and the association between the three environmental factors and allergic disease, and finally different strategies in preventing disease.

1.1 Allergic diseases; definitions, prevalence and risk factors

1.1.1 Atopy

When the study was planned in 1999 the word atopy was used in the title. A position statement from the European Academy of Allergy and Clinical Immunology (EAACI) Nomenclature Task Force proposed in 2004 that the definition of atopy should be as follows:

> *Atopy is a personal or familial tendency to produce IgE antibodies in response to low doses of allergens, usually proteins, and to develop typical symptoms such as asthma, rhinoconjunctivitis, or eczema/dermatitis.*

EAACI proposed that the terms atopy and atopic should be reserved to describe this clinical trait and predisposition, and not be used to describe diseases. The first manifestations of atopy in a child are often “allergic” symptoms, such as diarrhoea, wheezing, and skin rashes, and only later can the responsible IgE antibody be detected. The term atopy should be used with caution until IgE sensitisation can be documented. Therefore allergy has replaced atopy in the title, as the term allergic diseases best describes what we are studying.

1.1.2 Allergy

Allergy is a hypersensitivity reaction initiated by immunologic mechanisms. Allergy can be antibody- or cell-mediated. In most patients, the antibody typically responsible for an allergic reaction belongs to the IgE isotype and these patients may be said to

suffer from *IgE-mediated allergy*. It must be noted that not all IgE-associated allergic reactions occur in atopic subjects. Allergy can also be cell-mediated, as in allergic contact dermatitis, in which immunologically sensitised lymphocytes play a major role. Similar immunological mechanisms seem to be important in non-IgE-associated "atopic dermatitis/eczema" (see below).

1.1.2.1 The role of exposure level in allergy sensitisation

A cross-sectional survey that was part of the ISAAC multi-centre study describes the prevalence of atopic diseases in Icelandic schoolchildren[13] and concludes that the prevalence of atopic diseases and wheezing in Icelandic children was high and comparable to that in other countries in Europe. These findings are of interest, because the allergen load in Iceland is very low. The pollen count is very low compared with other European countries, pet ownership is low and house dust mites are absent. Iceland has had an affluent lifestyle for a considerable time, but the absence of dust mites, low pet ownership and relatively low pollen counts in the country raise doubts about the role of exposure levels in the development of sensitisation and atopic diseases.

1.1.3 Asthma

Asthma is a disorder defined by its clinical, physiological, and pathological characteristics. The predominant feature of the clinical history is episodic shortness of breath, particularly at night, often accompanied by cough. Wheezing appreciated on auscultation of the chest is the most common physical finding. The main physiological feature of asthma is episodic airway obstruction characterised by expiratory airflow limitation. The dominant pathological feature is airway inflammation, sometimes associated with airway structural changes. Asthma has significant genetic and environmental components, but since its pathogenesis is not clear, much of its definition is descriptive. Based on the functional consequences of airway inflammation, an operational description of asthma is:

> *Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. The chronic inflammation is associated with airway hyper responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are usually associated with widespread, but variable, airflow obstruction within the lung that is often reversible either spontaneously or with treatment*[14].

Because there is no clear definition of the asthma phenotype, researchers studying the development of this complex disease turn to characteristics that can be measured objectively, such as atopy (manifested as the presence of positive skin-prick tests, production of specific IgE, or the clinical response to common environmental allergens), airway hyper responsiveness (the tendency of airways to narrow excessively in response to triggers that have little or no effect in normal individuals), and other measures of allergic sensitisation. Although the association between asthma and atopy is well established, the precise links between these two conditions have not been clearly and comprehensively defined. Asthma was formerly classified according to the severity of the disease before commencing treatment. This classification has little predictive value regarding what treatment will be required and what the response to that treatment might be. There is now good evidence that the clinical manifestations of asthma symptoms – sleep disturbances, limitations of daily activity, impairment of lung function, and use of rescue medications – can be controlled with appropriate treatment. When asthma is controlled, there should be no more than occasional recurrence of symptoms and severe exacerbations should be rare. Therefore the Global Initiative for Asthma (GINA) in 2006 proposed a new classification based on level of asthma control[14]. According to the new classification, asthma is classified as controlled, partly controlled or uncontrolled.

In a study from British Columbia, Canada, the incident rate for asthma among children diagnosed at 2–3 years was 2.72 per hundred person years of follow-up[15]. In a Norwegian study, where use of anti-asthmatic medications was used as a proxy for prevalence of asthma in children, the highest asthma prevalence for both genders was found among children at about 2 years of age (7% of girls and 10.1% of boys)[16].

From the ISAAC study phase III, the prevalence of atopic wheeze (defined as current wheeze plus skin prick-test reactivity) among 8–12 year old children and non-atopic wheeze varied widely between centres. Atopic wheeze was least prevalent in Pichincha, Ecuador (0.2%), and most prevalent in Hawkes Bay, New Zealand (13.4%). In Tromsø and Østersund, 9.1% and 6.2% of the children reported atopic wheeze, respectively. In the UK 6.5% reported atopic wheeze[17]. The mechanisms initiating *non-allergic asthma* are not well defined, although similar inflammatory changes occur in both

forms of asthma. Several studies have shown that the patterns of risk factors for atopic versus non-atopic wheeze may differ between affluent and non-affluent countries[18-21]. Findings in phase III of the ISAAC protocol indicate that in most high prevalence countries (i.e., Western countries and English-speaking countries) the prevalence has peaked and is now decreasing, particularly in the 13–14 year age group. In regions where prevalence was previously low, increases in prevalence are found. Although the global differences in asthma prevalence are lessening, the global burden of asthma may continue to rise[22].

1.1.4 Eczema

In the broadest sense, dermatitis – inflammation of the dermis and epidermis – is a component of many skin diseases. The inflammatory process is primary and the signs and symptoms are typical. Erythema, scaling and usually pruritus occur in well-recognised patterns depending on the type of dermatitis. Usually dermatitis can be diagnosed visually, excluding other skin disorders[23]. One way to categorise dermatitis is by location on the body, with seborrheic, atopic, and stasis dermatitis all having a typical distribution. Another aid in classification is the presence of a personal or family history of underlying conditions as we see in individuals with atopic dermatitis.

In the revised nomenclature for allergy for global use[24], the term eczema was proposed to replace the term atopic eczema/dermatitis syndrome (AEDS) used in the previous version[25]. Since the work of the EAACI Nomenclature Task Force started, there has been increased acceptance of the basis for a term describing an aggregation of several skin diseases with certain clinical characteristics in common involving a genetically-determined skin barrier defect[26]. There is substantial evidence in support of a strong genetic component in the aetiology of atopic eczema. Twin studies show that an identical twin has an 80% chance of developing eczema if their twin is affected, whereas a fraternal twin has an approximately 20% chance of developing eczema if their twin is affected[27]. Eczema and other atopic disorders show clustering within families[28] and children whose parents have atopic eczema have a greater risk of developing eczema than children whose parents have asthma or hay fever[29]. These observations suggest that the genetic risk of eczema may be mediated through polymorphisms in genes encoding proteins important in the structure and function of

the skin, rather than through systemic immune or “atopy” risk genes. There is a growing understanding of the importance of epithelial barrier dysfunction in atopic eczema[30]. In 2006 it was reported that two common polymorphisms in the filaggrin gene (*fil*ament-*agg*regating prote*in*) are strong predisposing factors for atopic eczema[31]. Filaggrin aggregates keratin within the keratinocytes, helping to bring about their compaction into cell death and squame shape during cornification. In this way the cornified cells replace the keratinocyte cell membrane, which forms an important permeability barrier to water, microbes and allergens and provides mechanical defence by maintaining skin integrity.

As long as the immunological mechanism of eczema is unclear, the disease should be referred to as eczema. Eczema without any signs of an atopic constitution is common in preschool children[32]. Non-atopic children with eczema have been reported to have less risk of developing asthma as adolescents than atopic children with eczema[32,33]. However, non-atopic eczema in children may evolve into atopic eczema. The differentiation of atopic eczema from eczema in general seems to be of significant prognostic importance for the long-term prognosis and it is therefore important to know that the risk of the development of an IgE-mediated respiratory disease is much lower in the case of non-atopic eczema[34].

1.1.5 Allergic rhinitis

A novel classification of allergic rhinitis according to duration and severity of symptoms was suggested by the World Health Organization initiative, “Allergic Rhinitis and Its Impact on Asthma” (ARIA)[35]. Rhinitis is defined as an inflammation of the lining of the nose and is characterised by nasal symptoms including anterior or posterior rhinorrhoea, sneezing, nasal blockage and/or itching of the nose. These symptoms occur during two or more consecutive days for more than one hour on most days. Allergic rhinitis is the most common form of non-infectious rhinitis and is associated with an IgE-mediated immune response against allergens. It is often associated with ocular symptoms. Several non-allergic conditions can cause similar symptoms; infections, hormonal imbalance, physical agents, anatomical anomalies and the use of certain drugs. Symptoms of allergic rhinitis include rhinorrhoea, nasal obstruction[36], nasal itching and sneezing which are reversible spontaneously or with treatment. Postnasal drip mainly occurs either with profuse anterior rhinorrhoea in

allergic rhinitis or without significant anterior rhinorrhoea in chronic rhino sinusitis. Preschool children may just have nasal obstruction. However, when nasal obstruction is the only symptom, it is very rarely associated with allergy. Patients with non-allergic rhinitis may have similar symptoms[37]. Allergic rhinitis is subdivided into *intermittent* or *persistent* disease. The severity of allergic rhinitis can be classified as *mild* or *moderate/severe*. Thus, *intermittent* and *persistent* describe duration, and *mild* and *moderate-severe* define effect of symptoms on sleep, work, and other activities.

The clinical definition of rhinitis is difficult to use in the epidemiological settings of large populations where it is impossible to examine everybody or to obtain the laboratory evidence of an immune response. So far there has been no standardisation of the definition of rhinitis in epidemiological studies, and thus comparison of prevalence between studies is difficult[35].

1.2 The risk factors studied and their association to allergic diseases

1.2.1 The role of second-hand smoke in allergic disease

Passive smoking during or after pregnancy has been shown to be a risk factor for the development of both allergic sensitisation and obstructive respiratory disease in children[38].

1.2.1.1 Second-hand smoke and allergic sensitisation

The association between exposure to tobacco smoke in childhood and risk of atopic sensitisation has been extensively studied but the data is inconclusive[39-42]. In a comprehensive review in 1998, it was concluded that parental smoking is unlikely to increase the risk of IgE sensitisation in children[41]. This review, however, primarily dealt with studies of relatively small size and none was a birth cohort study. Subsequent larger birth cohort studies still do not provide a consistent picture. Thus in the German Multicentre Allergy Study, no association was demonstrated between prenatal or postnatal exposure to tobacco smoke and IgE sensitisation to inhalant allergens at the three-year follow up, whereas an association was found for sensitisation to food allergens[39]. In “The National Asthma Campaign in Manchester”, little or no effect of second-hand smoke was found on the development of atopy[40].

A recent published study from Sweden[42] found no evident increase in the risk of any sensitisation (i.e., inhalant and/or food allergens) if the mother had smoked during any of the trimesters (adjusted odds ratio (aOR) 1.00 (95% CI 0.61 to 1.66)) but not thereafter. On the other hand, exposure to SHS at 2 months of age, without previous in-utero exposure, tended to be associated with sensitisation (aOR 1.26 (95% CI 0.95 to 1.68)) and there was no clear evidence of interaction between in-utero and postnatal exposure. For postnatal SHS exposure, with or without exposure in utero, the adjusted ORs for sensitisation to inhalant allergens were 1.12 (95% CI 0.84 to 1.48), for food allergens 1.46 (95% CI 1.11 to 1.93) and for any sensitisation 1.28 (95% CI 1.01 to 1.62). In conclusion, data from the Swedish study indicates that SHS exposure in early infancy increases the risk of sensitisation to indoor inhalant and food allergens.

1.2.1.2 Second-hand smoke and asthma

Strachan and Cook presented a complex picture of the associations of parental smoking with asthma incidence, prognosis, prevalence, and severity[43]. In their review they found that illness in early life was increased if there was smoking in the household, particularly by the mother[44], whereas the incidence of asthma during the school years was less strongly affected by parental smoking. A similar age-related decline in the strength of the passive smoking effect was found in cross-sectional studies[45]. They concluded that this may simply reflect the diminishing level of exposure to SHS from household sources as children grow up[46]. Alternatively or additionally, parental smoking may have differential effects on the incidence of various forms of wheezing illness[47], with a stronger influence on viral-associated wheezing (common in early childhood) and a weaker relationship with atopic wheezing (often of later onset). Three studies comparing wheezing in atopic and non-atopic children lend support to the latter hypothesis[48-50].

1.2.1.3 Exposure to SHS and early lung function

Several studies concerning the effects of exposure to SHS and lung function in newborns and early life have been published. In the first studies published concerning the relationship between exposure to SHS and reduced lung function in infants, lung function was measured from 4 to 5 weeks of age[51]. Small numbers were exposed exclusively at the prenatal or postnatal stage, so one cannot exclude the possibility that

postnatal exposure might influence the results. It was important to measure lung function in newborn babies to exclude a possible effect of postnatal exposure to SHS.

From a birth cohort, the Environmental Childhood Asthma study in Oslo, more than 800 newborn infants had their lung function measured on their second to fifth day of life by tidal flow–volume loops and passive respiratory mechanics[52]. Reduced lung function was demonstrated in the newborn infants of smoking mothers in a dose–response pattern. A significant relationship was found both for the ratio of time to peak flow/total expiratory time and for compliance of the total respiratory system[52]. Similar results for compliance of the total respiratory system were found in a British study of 189 newborn children whose mother had smoked during pregnancy, who were compared with 100 newborn children of non-smoking mothers, but the differences were significant only for boys[53]. Another study from Australia confirmed the finding of a reduction in the ratio of time to peak flow/total expiratory time in the newborn infants of smoking mothers[54].

How early does the reduction in lung growth start in the infants of smoking mothers? In a study of prematurely born infants in England, similar findings to those cited above, of a reduction in the ratio of time to peak flow/total expiratory time and compliance of the total respiratory system, were found in 40 out of 108 infants at a mean of 33 weeks' pregnancy[55]. This suggests that the effects of maternal smoking on development of the lungs may start early during pregnancy.

1.2.2 The role of diet in allergic diseases

In a review article from 2000, Fogarty and Britten[56] stated that several nutrients such as magnesium, vitamin C, vitamin E, pyridoxine, manganese, copper, potassium, selenium and fatty acids may be involved in the aetiology of asthma. Overall, they stated, there was a general consistency in the evidence that an unhealthy diet seemed to be associated with an increased risk of asthma.

1.2.2.1 N-3 fatty acids and allergic diseases

An increase in allergic diseases has been preceded and paralleled with changes in dietary intake of polyunsaturated fatty acids[57]. A shift towards increased consumption of n-6 polyunsaturated acids (n-6 PUFAs) and decreased consumption of n-3 pol yunsaturated acids (n-3 PUFAs) and oily fish has been observed[58]. A diet rich

in n-3 PUFAs during pregnancy may decrease the risk of allergic diseases in the offspring[59]. Since the 1990s there has been a growing interest in the role n-3 PUFAs might play in primary prevention of allergic diseases, and several studies have examined the association between n-3 PUFA supplementation, either during pregnancy or during infancy. A diet rich in n-3 PUFAs during pregnancy may decrease the risk of allergic diseases in the offspring[59]. A randomised controlled trial confirmed that maternal fish-oil supplementation during pregnancy significantly changed the composition of fatty acids in neonatal erythrocyte membranes, and also changed the cytokine profile of leucocytes in response to allergen exposure[60]. A potential reduction in subsequent infant allergy after maternal fish oil supplementation was suggested, but the study was not designed to assess clinical effects. A Cochrane review on dietary marine fatty acids for asthma in adults and children concluded that there is little e vidence to recommend that people with asthma should supplement or modify their dietary intake of n-3 PUFAs in order to improve their asthma control[61]. Blümer and Renz concluded in their review that there is evidence that a perinatal n-3 PUFA supplementation has anti-allergic effects on disease-related symptoms like allergic rhinitis, wheeze or atopic cough[62]. The body of evidence according to the review is not conclusive. Accordingly, a large randomised controlled trial to test modification of n-6/n-3 dietary intake in the first 5 years of life of children with a family history of asthma was successful regarding change in plasma n-6/n-3 ratio, but no effect on the prevalence of asthma, wheezing, eczema or atopy was found[63].

1.2.2.2 Fish and allergic diseases

Frequent intake of fish during pregnancy may counteract the development of allergic sensitisation for food allergens in the offspring of mothers without atopic disease[64]. Observational studies have suggested a protective effect of at least two fish meals a week on bronchial hyper responsiveness in 7–11 year old children and of eating oily fish on the prevalence of asthma[65]. Frequent intake of fish during pregnancy may contrast the development of skin-prick sensitisations for food allergens in offspring of mothers without atopic disease[64]. Sausenthaler et al., who found that a diet rich in n-3 PUFAs during pregnancy may decrease the risk of allergic diseases in the offspring, found no correlation between maternal consumption frequency of fish and time for introduction of fish during the first year of life[59]. Salam et al. found that maternal oily fish intake during pregnancy may protect offspring from asthma; however, eating

fish sticks (which are rich in trans fats) during pregnancy may increase asthma risk in children[66]. This study did not account for the children's diet during the first year of life.

Hodge et al.[65] showed, in a cross-sectional study of 9 year old children, that regular consumption of fresh, oily fish was associated with a reduced risk of current asthma. This reduced risk remained significant after adjustment for other known risk factors for asthma.

In a study of 4300 young adults (20–44 yrs) on the west coast of Norway[67], fish consumption was not significantly associated with self-reported respiratory symptoms. The intake of fish was high, and the prevalence of asthma low, thus a minor protective effect of fish consumption on respiratory symptoms could not be ruled out. A large cross-sectional study from Japan showed a higher prevalence of asthma among children aged 6–16 years who ate fish one to two times a week than among those who ate fish one to two times a month. A dose response relationship was found. The first study to find an association between ordinary dietary fish intake and lung function in an epidemiological context was a cross-sectional sample of 2526 adult subjects aged 30–70 yrs from the First National Health and Nutritional Examination Survey (NHANES I). A difference of 115 ml in FEV1 between those eating fish less than once a week, and those eating fish more than once a week was found. There were few asthmatics in this population (2.6%), so the impact of eating fish on asthma could not be established[68]. Two Scandinavian studies have investigated the association between consumption of fish during the first year of life and asthma and allergic diseases at 4 years of age[69,70]. Both studies showed a protective effect of early introduction of fish on allergic diseases at 4 years of age. Controlling for disease-related modification of exposure in the Swedish study did not change the association[70]. Neither of the studies had information on maternal intake of fish or n-3 PUFAs during pregnancy.

1.2.2.3 Margarine and allergic diseases

Margarine is the only food factor to date that has been associated with allergic disease without provoking any allergic reaction and this positive association between margarine and allergic diseases has been shown in more than 10 studies. There have been different explanations for these phenomena. One is that margarine alters the n-6 PUFA /n-3

PUFA ratio and thereby a modulation of the synthesis of IgE and inflammatory mediators[71,72]. Another explanation is that margarine has been enriched with vitamin D3 in many countries for several decades. Due to experimental and epidemiological findings on the immunological action of vitamin D3 and its metabolites, some hypothesise that vitamin D3 supplement may be responsible for the observed effect of vitamin D3-enriched margarine[73].

1.2.2.4 Fruit and vegetables

Fruit and vegetables contain many potentially important vitamins and antioxidants. Reactive oxygen species have been associated with airway inflammation. Among children, consumption of fresh fruit, particularly fruit high in vitamin C, has been related to a lower prevalence of asthma symptoms and higher lung function[74]. Low intake of vegetables and fruit has been associated with respiratory symptoms as cough and wheeze[75], whereas a Mediterranean diet, rich in fresh fruit and vegetables, during childhood had a beneficial effect on symptoms of asthma and rhinitis in a study from Crete[71]. The Mediterranean diet is characterised by elevated intake of plant foods such as fruits and vegetables, bread and cereals, legumes and nuts. All these are important sources of dietary antioxidants.

A high adherence to a Mediterranean diet during pregnancy was found to be protective against persistent wheeze, atopic wheeze and atopy at age 6.5 years after adjusting for potential confounders[76]. In a Norwegian study it was shown that daily consumption of fresh fruit or vegetables during the first year of life was associated with less asthma at 12 years of age, whereas intake of fruit and vegetables less than daily had no protective impact. It was also shown that extra vitamin supplements were not associated with later asthma development[77].

1.2.3 The role of indoor dampness and allergic diseases

1.2.3.1 Indoor dampness and allergy

A high level of indoor dampness provides optimal conditions for the growth of mites. Several studies have indicated a positive correlation between allergy prevalence and indoor dampness[78,79].

1.2.3.2 Indoor dampness and asthma and wheeze

Living in a damp home is considered a risk factor for asthma in infants. In schoolchildren and in a meta-analysis, Fisk et al. found that building dampness and mould were associated with an approximately 30–50% increase in a variety of respiratory and asthma-related health outcomes[80]. Dampness is considered a risk factor for bronchial obstruction in young children[81]. In homes with dampness and low air exchange, the risk of bronchial obstruction was increased with a threefold[82]. Dampness is considered a risk factor for respiratory symptoms in newborns and in schoolchildren[83]. Dampness in itself is probably not the causal agent, but dampness or moisture are known to promote the growth and proliferation of dust mites, mould, and bacteria, exposure to which can result in allergic or infectious health outcomes. Dampness also promotes the degradation of some building materials and furnishings and can increase and alter their emissions.

1.2.3.3 Indoor dampness and eczema

A number of studies have suggested an association between house dust mite and atopic eczema. House dust mites thrive in damp conditions, and housing dampness may therefore be an indicator of house dust mite. In a study from Nottingham, a statistically significant association was shown between atopic eczema symptoms and dampness in the child's home[84]. The population attributable risk was estimated to be 4% for housing dampness. The suggested explanation was an indirect effect of dampness through house dust mite. Later studies have questioned the link between house dust mite and atopic eczema[85,86]. No clear linear association between early exposure to house dust mites was found. The risk of eczema appeared to increase for the three lowest quintiles of house dust mite allergen exposure[87].

1.3 Prevention strategies; definitions and key concepts

In medicine, prevention is any activity that reduces the burden of mortality or morbidity from disease by measures taken to prevent illness or injury, rather than curing them. This type of care can be exemplified by hand washing and immunisation. It can be contrasted not only with curative medicine, but also with public health methods (which work at the level of population health rather than individual health). Rose's Theorem states that "a large number of people at small risk may give rise to more cases of disease than a small number who are at high risk"[88]. In the PACT study several types

of prevention strategies have been used to accomplish the primary objective of the study; reduced incidence of allergic diseases among children. The smoking intervention in PACT used a “high-risk” strategy[89], i.e., female smokers were identified and offered a structured smoking cessation programme[90]. This “high-risk” strategy led to an intervention that was appropriate to the pregnant women smokers and their partners. Regarding the dietary intervention, we used a population strategy, i.e., we tried to change the risk factor level for the whole population of pregnant women and their offspring regarding the intake of cod liver oil and oily fish. When it comes to the housing dampness intervention, we used a combined approach, a “high-risk” strategy was used to identify houses with dampness problems, and advice was given to improve the situation. A population strategy was used to lower housing dampness for the whole population as all participants were given advice on how to reduce housing dampness, both written and verbally, regardless of whether they participated in the intervention or not. Prevention can be applied at primary, secondary and tertiary prevention levels[88,89].

1.3.1 Primary prevention

Primary intervention occurs at a systems level to reduce the number of new cases (incidence) of a potential problem (e.g. in the PACT study, reducing incidence of allergic diseases among children by reducing assumed risk factors for allergic disease).

1.3.2 Secondary prevention

Secondary intervention is concerned with reducing the number of existing cases (prevalence) of an already identified condition or problem. Secondary prevention involves the promotion of compensatory skills and behaviours (e.g. in the PACT study extra effort was focused on parental smoking cessation and preventing smoking relapse in those who stopped smoking).

1.3.3 Tertiary prevention

Tertiary interventions are concerned with reducing the complications associated with an existing and identified problem or condition and were not the scope of this thesis.

1.3.4 Environmental prevention

Environmental prevention approaches are typically managed at the regulatory or community level, and focus on interventions to deter drug consumption. Prohibition

and bans (e.g. workplace smoking bans, alcohol advertising bans) may be viewed as the ultimate environmental restriction. Norway has had a governmental agency working for tobacco control since 1971. The Tobacco Control Department in the Norwegian Directorate of Health has the main responsibility for governmental tobacco control initiatives and implementation, as well as being the supervisory authority for certain provisions in Norwegian tobacco control legislation. Milestones of the Norwegian tobacco legislation are shown in Table 1.

Table 1

1965	The Norwegian Parliament appoints an interdisciplinary committee to investigate what measures could be implemented to combat the health problems caused by tobacco use.
1971	The National Council on Tobacco and Health (a governmental office for tobacco control) is established.
1973	The Act relating to Restrictive Measures for the Marketing of Tobacco Products (the Tobacco Act) is sanctioned.
1975	The Tobacco Act comes into force (advertising ban, 16 years age limit, labelling).
1988	The Clean Air Act is adopted. It provides for smoke-free air in public localities and means of transportation.
1993	Restrictions on smoking in public restaurants, bars, cafés, pubs and discotheques. Smoking was allowed in 2/3 of the establishment's premises.
1998	Further restrictions on smoking in public restaurants, bars, cafes, pubs, discotheques. Smoking was only allowed in 50% of the establishment (as opposed to 2/3).
2002	Amendments to the Tobacco Act are passed. These include a ban on misleading descriptors such as "light" and "mild". A legal basis for demanding disclosure of ingredients in tobacco is also enacted.
2003	The bill concerning a total ban on smoking in bars, restaurants, cafés etc. is passed by Parliament. The first national comprehensive mass media campaign on tobacco and health. For many years a public health campaign is run in Norway, adapted from the Australian campaign "Every cigarette is doing you damage".
2004	Total ban on smoking in restaurants and bars takes effect on 1 June 2004.

1.3.5 Individual intervention

Intervention can be given individually or in groups. In the PACT study we offered intervention individually at consultations with GPs, midwives and health nurses and in groups at two selected maternity care centres, where we offered smoking cessation support in groups.

1.3.6 Legislation

Another level of intervention is legislation. Norway has a history of more than 40 years of regulation of tobacco advertising and tobacco smoking in public. During the study period, a total ban on smoking in restaurants and bars took effect on 1 June 2004 (Table 1).

1.3.7 Mass media campaigns

Anti-tobacco media campaigns, often called counter-advertising campaigns, were originally aimed at countering the effects of tobacco advertising by cigarette manufacturers. Their focus was generally to change individual behaviour by discouraging smoking. Campaigns have also attempted to decrease smoking rates by changing social norms through generating public support for various tobacco control policies, such as new tax initiatives or clean indoor air laws[91], or by scaring people from smoking, as in the national televised anti-smoking campaign in Australia[92,93], which proved to be very cost effective[94].

Norway has recently focused more on mass media campaigns. In January 2003, a campaign was based on the Australian campaign, “Every cigarette is doing you damage”. Survey evaluations have shown several positive trends, but not statistically significant results. A decline in the consumption of cigarettes of 4.5% during the first five months of 2003, compared with the first five months of 2002, was registered.

The PACT study was initiated with inclusion of a control cohort in September 2000. After having developed the guidelines, the interventional programme started in a consecutive cohort in July 2002, and is still in progress. Amongst the many challenges in conducting a study on primary prevention of allergic diseases was the selection of applicable intervention topics that were associated with allergic diseases, were easy to implement in primary health care, and eventually, were measurable with reliable and valid tools.

The primary objectives of the PACT study were to investigate the effectiveness of the risk-factor intervention on behavioural changes among parents, secondly to investigate the efficacy on the incidence of allergic diseases in the offspring from increasing n-3 fatty-acid intake and reducing second-hand smoke exposure and indoor dampness.

2 Objectives

The aims of the thesis were to answer the questions:

1. Does primary intervention of allergic disease among small children, in the frame of ordinary primary care, lead to change in exposure?

2. Does intervention against smoking during pregnancy have any impact on smoking behaviour when conducted locally in a real life primary care setting?

3. Were the questions constructed to assess allergic disease among 2 year olds reliable?

4. Do consumption of cod liver oil and oily fish during pregnancy and in infancy prevent parent-reported eczema and doctor-diagnosed asthma in 2 year olds?

The questions will be addressed through four papers:

Paper I

A primary health-care intervention on pre- and postnatal risk factor behavior to prevent childhood allergy. The Prevention of Allergy among Children in Trondheim (PACT) study.

Paper II

The impact of a minimal smoking cessation intervention for pregnant women and their partners on perinatal smoking behaviour in primary health care: A real-life controlled study.

Paper III

Assessing atopic disease in children two to six years old: Reliability of a revised questionnaire.

Paper IV

Do early intake of fish and fish oil protect against eczema and doctor-diagnosed asthma at 2 years of age? A cohort study.

3 Material and Methods

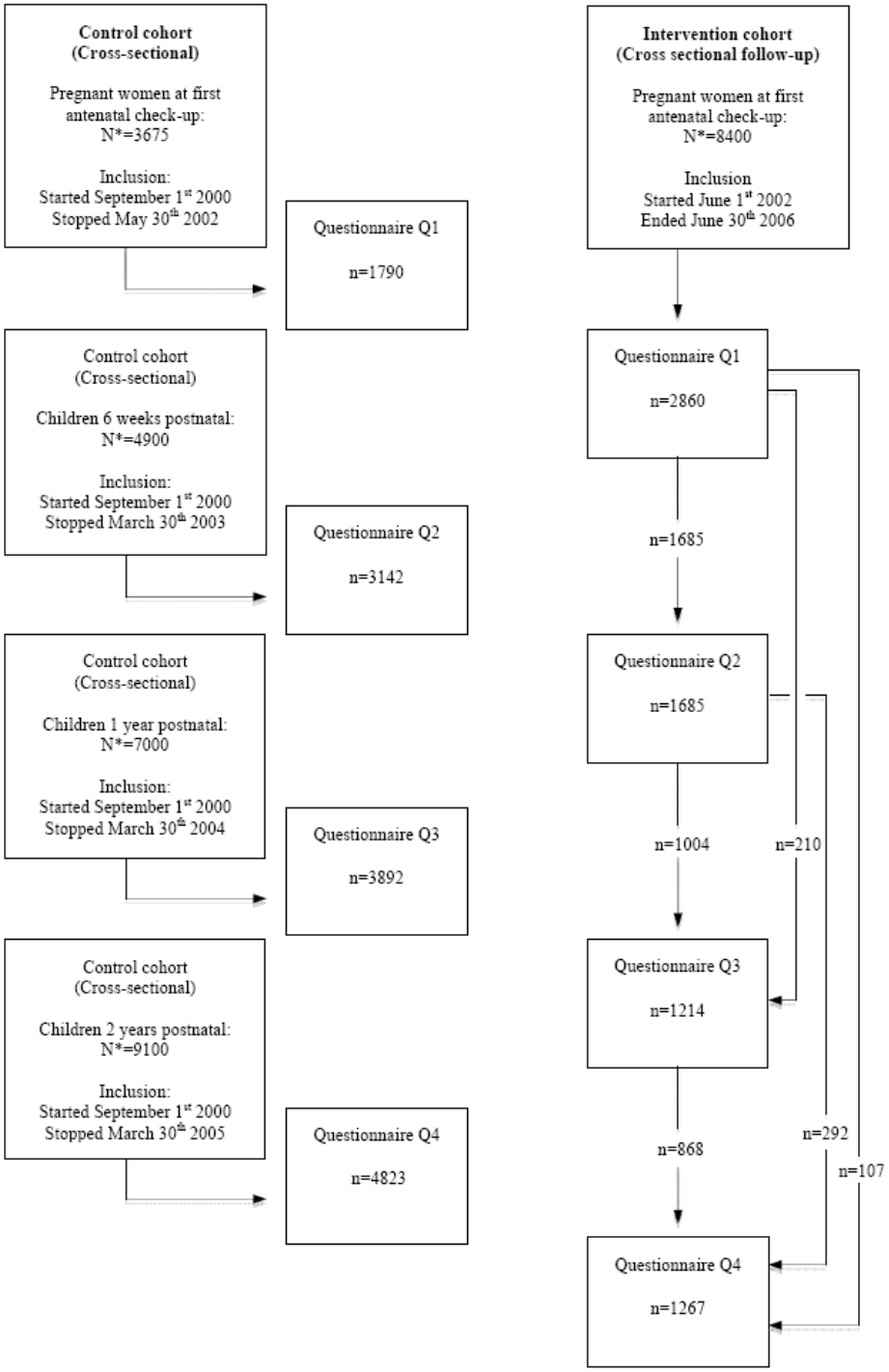
3.1 PACT study

The PACT study is an ongoing cohort study in primary health care in the city of Trondheim, the capital city of central Norway, with 165 000 inhabitants and approximately 2100 births per year. In all, 32 of 35 general practices (104 general practitioners), all seven community-based midwives and all 20 maternity health centres in Trondheim agreed to participate. The three practices that refused to participate were all single practices. Additionally, four group practices withdrew from including women to the intervention cohort.

The main purpose of the control cohort was to supply cross sectional data to monitor potential changes in lifestyle and diet habits and trends in incidence of allergic diseases during the study period (Paper I). Secondly, participants in the control cohort who answered more than one questionnaire could be followed in a prospective design (Paper II and IV).

Admission to the control cohort started in September 2000 and ended December 2004. All pregnant women and children at 6 weeks, 1 year, and 2 years after birth were eligible to participate and included at ordinary scheduled consultations with GPs, midwifes or by health visitors. Inclusion to the control cohort ended when the intervention started for the actual age group (Figure 1). All women who had children in these birth-cohorts, who received an invitation and were willing and able to complete a self-reported questionnaire in Norwegian, after giving written informed consent to participate, were included in the study with no further selection criteria. Recruitment to the intervention cohort started in July 2002, and all participants were included by GPs and midwives during pregnancy. The inclusion ended in June 2006, and collection of questionnaires at two years after delivery continued until March 2009 (Figure 1).

3.2 Figure 1 (Flow-chart)



A total of 7845 participants in the control cohort completed 13647 self-reported questionnaires from 2002-2005.

The intervention cohort was completed in March 2009.

* Total population of children born in Trondheim during inclusion period.

Q1=Questionnaire on behavior and risk factors at first antenatal check-up during pregnancy

Q2=Questionnaire on behavior and risk factors at 6 weeks of age.

Q3=Questionnaire on behavior and risk factors at 1 year of age.

Q4=Questionnaire on behavior and risk factors at 2 year of age

The interventional program was developed in collaboration between community midwives, maternity care nurses, GPs and parents and should be implemented as a part of ordinary antenatal and postnatal care at scheduled consultations. The officially recommended schedule for primary care antenatal and postnatal consultations in Norway was followed for both cohorts. This programme is accessible and recommended for all women, free of charge, and with a nationwide attendance rate of nearly 100% in both urban and rural areas. Interventions should be repeated at scheduled consultations throughout pregnancy until two years postpartum. The schedule constitutes of 8 to 10 antenatal consultations with a GP or midwife from the eighth–tenth week in pregnancy, followed by 10 postnatal consultations with public health nurses at maternity care centres during the child's first year of life. The interventions could be simultaneous or sequential, but repeated at least five times for each topic, both pre- and postnatal, within the recommended maternity care schedule and without extra expenditure of time. The interventional programme should be implemented without extra costs to the participants or the primary health care system.

4 Interventional strategies

4.1 The n-3 PUFA intervention

In Norway a daily supplement of cod liver oil is very common and is already recommended for children and adults alike. In the intervention programme we aimed for:

- Increased dietary intake of n-3 PUFAs by intake of at least two meals of oily fish a week and 5 ml cod-liver oil a day during pregnancy (5 ml cod liver oil = 1.2 g n-3 PUFA).
- Cod liver oil to be introduced to children's diet from 4 to 6 weeks of age, increasing to 5 ml/ day, and oily fish at least twice a week from 6 months of age as part of a meal or spread on a sandwich.

4.2 The smoking cessation and SHS intervention

The smoking intervention programme was a brief office intervention[95-97]. The intervention was adapted from the United States Department of Health and Human Services Public Health Service (USHPS) guideline *"Treating Tobacco Use and Dependence. Clinical Practice Guideline"*[90].

4.3 The indoor dampness intervention

To detect and reduce home dampness the interventional strategy was to provide advice on how to detect water and dampness damage in domestic housing, and advice on how to reduce risk factors for home dampness and its consequences.

4.4 The non-participants study

To investigate if there was a selection bias in the PACT study we conducted an additional non-participants study, where 391 parents who consecutively visited maternal postnatal care were asked to complete a short and anonymous questionnaire on age, education, familial allergic disease and smoking behaviour, regardless of whether they participated in the PACT study or not (Paper I, II and IV).

4.5 Medical Birth Registry of Norway

Aggregated data from the Medical Birth Registry of Norway (MBR) were used to illustrate smoking cessation in Norway and the two comparable cities of Bergen and

Trondheim from 1999 to 2004. Smoking data from the MBR were available from 1999 to 2004. These data are collected as a mandatory procedure at discharge from any maternity ward in Norway, a procedure that has existed since 1967. Since 1999, registration of smoking habits during pregnancy has been included in the standardised notification form and reported to the MBR. Forms are completed in an interview with a midwife or physician and by using the hospital medical records. The women are asked if they smoked at the beginning or end of pregnancy, and they can answer "no", "occasionally" or "yes". Smoking is coded as a dichotomous variable, "occasionally" and "yes" are coded as smokers, "no" as non-smokers. Data were available for approximately 90% of the women who gave birth during the period from 1999 to 2004, according to information from the MBR.

4.6 Study variables

4.6.1 Exposure

The risk factors and life-style were monitored by questionnaires completed by the mothers during pregnancy, and when the child was 6 weeks, 1 and 2 years of age (Appendix 1–4). Validated questionnaires for the actual age-group were not available at the time, and questions were adapted from various sources[12,98-100]. The topics covered in all questionnaires were; number of siblings, parietal status, birth weight, vaccinations, marital status, heredity for allergic disease, pregnancy conditions, housing conditions and indoor environment, semi-quantitative food frequency data for mother and child, parental smoking behaviour and information on child care[101-103]. Exposure variables subject for intervention will be described more in detail.

4.6.1.1 Housing conditions

Housing conditions and indoor dampness was assessed by asking for eight different indicators on indoor dampness, such as mould or musty smell, moist cardboard and newspapers after storage, dew on windows, moist spots on ceilings, walls or wallpapers, leakage detected on water pipes or taps, leakage from roof or ground, or moisture in floors. If "yes" to any question, the follow-up question was whether the problem was repaired. Alternatively, the answer could be "no" to all.

4.6.1.2 Diet

Information regarding age for introduction of a variety of food products, including different kinds of porridge, bread, vegetables, fruit, commercially-produced baby food, homemade baby food, fish, cows' milk, and eggs, were obtained when the children were 1 year of age. Duration of breastfeeding, time for introduction and type of infant formula, vitamins and cod liver oil, information on consumption of vegetables, cod liver oil, lean fish (cod and coalfish) and oily fish (redfish, halibut, salmon, trout, herring and mackerel) as meals and sandwich spread were collected by using a set of validated semi-quantitative food frequency questions with six categories; never, less than once a week, once a week, twice a week, three times a week and four times a week or more, and re-categorised later in the analyses[101,102]. Lean and oily fish as a meal was separately dichotomised, merging never and less than once a week into category zero, and the remaining four values into category one. Fish as sandwich spread was set to category zero if consumption was two slices or fewer per week. Eating more than two slices a week with fish as sandwich spread was set to category one, which was equivalent to eating one meal of oily fish or more a week. When we analysed eating any kind of fish, the sum of the dichotomised values of lean fish, oily fish, and fish as sandwich spread were reclassified into two categories. If the sum of the three dichotomised values was zero, it was equivalent to never eating fish, or less than once a week. If the sum was one or more, it was equivalent to eating fish once a week or more.

4.6.1.3 Tobacco exposure

Parental smoking during pregnancy was assessed with two questions, where the women were asked if they or their partner were smoking at start pregnancy, if they were smoking now and daily and/or weekly cigarette consumption. A separate question was asked about the total numbers of cigarettes smoked indoors. Smoking was coded as a dichotomous variable, if they were smoking more than one cigarette a week they were coded as smokers, if the answer was no they were coded as non-smokers, and if the answers to all questions on smoking were missing they were coded as missing.

4.6.2 Outcome variables

4.6.2.1 Parent-reported outcome variables

The questionnaire consisted of 26 questions designed to assess symptoms of allergic diseases, and two questions on infectious diseases and hospitalisation during the first

two years of life (Appendix 5). Three main requirements were specified in developing the questionnaire:

First, the extent of the questionnaire should be sufficient to estimate symptoms and complaints consistent with asthma, rhinoconjunctivitis, and eczema/dermatitis, and to describe the use of health care services and treatment for these diseases. Second, the questionnaire should be suitable to complete during a maternal and child health centre consultation of average duration, i.e. 30 minutes. Third, it should be designed to obtain satisfactory validity.

We used parent-reported eczema or doctor-diagnosed asthma at 2 years as the primary outcome variable (Paper IV). Asthma was defined as answering "yes" to; "Has the child ever had doctor-diagnosed asthma?" Eczema was defined as answering "yes" to both; "Has the child ever had eczema?", and "Has the child ever had an itchy rash coming and going for at least six months?"

4.6.2.2 Outcome variables from medical records

In the "Children's health questionnaire" ten of the questions revealed information that could be expected to be found in medical records. Information obtained from various medical records in primary health care, paediatric practices, and in hospitals, was used in paper III to assess reliability by evaluating the agreement between answers given on these ten questions and information obtained from medical records. Two investigators assessed all the information in the health records, and then both completed a registration form for each participant. When doubt or disagreement in interpretation of the medical records was experienced, consensus between the investigators was obtained through discussion.

4.7 Statistical methods

4.7.1 Tests used

Chi-square statistics were used for testing comparisons between the cohorts and groups for reported binomial data like smoking, atopic disease, pets in dwelling unit and dichotomised dietary factors (Paper I, II and IV). Independent sample T-test was used to test comparisons between the cohorts and groups for continuous data, like age, education and birth weight. A 95% confidence interval was based on binomial distribution for dichotomous data, and normal distribution for continuous data. The level of significance was set to $p = 0.05$ (Paper I, II and IV).

We used generalised linear models (GLM) with binomial regression in a predictive model (STATA version 10.0) to adjust smoking prevalence (Paper II). Binary logistic regression models were used to estimate adjusted odds ratios (aORs) (Paper I, II and IV). Kappa statistics were used to analyse the agreement between answers given in the questionnaire and information obtained from different medical records. Estimated observed agreement and proportional agreement were also used (Paper III). Kendall's tau-b correlation was used to test inter-correlation between different dietary variables (Paper IV).

Absolute risk reductions were estimated and given with 95% CI intervals (Paper IV).
Confounding factors were identified by *a priori* knowledge and tested firstly in univariate logistics regression and finally in multivariate regression analyses. Adjustments were made for gender, familial atopy (none, one, two, or three), parental smoking one year after birth (none, one or both parents); children's consumption of cod liver oil and vegetables at 1 year of age, parental homeowner status as a proxy for social class during the first year of life, and exclusively breastfeeding for more than 4 months (Paper I, II and IV).

5 Main results

5.1 Review of paper I

Background

This study aimed to evaluate the impact of a primary prevention intervention program on risk behavior for allergic diseases among children in a pre- and postnatal primary healthcare setting.

Methods

The Prevention of Allergy among Children in Trondheim, Norway (PACT) study invited all pregnant women and parents to children up to 2 years of age in the community to participate in a non-randomized, controlled multiple life-style intervention study aiming to increase dietary intake of cod liver oil and oily fish for women during pregnancy and for infants during the first 2 years of life, to reduce parental smoking and to reduce indoor dampness. A control cohort with "follow up as usual" was established before the intervention cohort. Questionnaires were completed for both cohorts in pregnancy, 6 weeks after birth and when the children were 1 and 2 years of age. Trends in exposure and behavior are described.

Results

Intake of oily fish and cod liver oil increased statistically significantly among women and infants in the intervention cohort compared to the control cohort. There was a low postnatal smoking prevalence in both cohorts with a trend towards a decreasing smoking prevalence in the control cohort. There was no change in indoor dampness or in behavior related to non- intervened life-style factors.

Conclusions

The dietary intervention seemed to be successful. The observed reduced smoking behavior could not be attributed to the intervention program, and the latter had no effect on indoor dampness.

5.2 Review of paper II

Background

There is a demand for strategies to promote smoking cessation in high-risk populations like pregnant women who smoke and their partners. The objectives of this study were to investigate parental smoking behaviour during pregnancy after introduction of a prenatal, structured, multi-disciplinary smoking cessation programme in primary care,

and to compare smoking cessation among pregnant women in Trondheim, Bergen and all of Norway.

Methods

Sequential birth cohorts were established to evaluate the intervention programme from September 2000 to December 2004 in primary care as part of the Prevention of Allergy among Children in Trondheim (PACT) study. The primary outcome variable was self-reported smoking behaviour six weeks after birth. Data from the Medical Birth Registry of Norway (MBR) was used to describe smoking behaviour during pregnancy in Trondheim, Bergen and all of Norway, 1999–2004.

Results

At inclusion during pregnancy, 25% (CI 95% 20–31) and 32% (CI 95% 26–38), p= 0.17, of the women who smoked before pregnancy were still smoking in the intervention and control cohorts, respectively. Maternal smoking prevalence at inclusion in the intervention cohort was 5% (CI 95% 4–6) compared with 7% (CI 95% 6–9), p=0.03, in the control cohort. At six weeks postnatal, 72% (CI 95% 59–83) and 68% (CI 95% 57–77), p =0.34, of the maternal smokers at inclusion still smoked. No significant difference in paternal smoking was found between the cohorts after the intervention period. Data from the MBR showed a significantly higher proportion of women who stopped smoking during pregnancy in Trondheim than in Bergen in 2003 and 2004, p=0.03 and <0.001, respectively.

Conclusions

No impact on parental smoking behaviour between the cohorts was observed after the smoking intervention programme. Of the women who stopped smoking during pregnancy, most stopped smoking before the intervention. However, we observed a significantly higher quitting rate in Trondheim than in Bergen in 2003 and 2004, which may have been facilitated by the supplemental attention on smoking behaviour the PACT study initiated.

5.3 Review of paper III

Background

Primary intervention – reducing second hand smoking (SHS), indoor dampness, and increased intake of n-3 fatty acids – for allergic diseases such as asthma, rhinoconjunctivitis, and eczema/dermatitis in children, was started in Trondheim in 2002. To our knowledge, no validated or reliable questionnaires for the study age

groups were available. Aim: To test the reliability of a revised questionnaire for studying atopic disease in children aged 2 to 6 years in Trondheim.

Methods

Seventy-seven families were invited to fill in a questionnaire adapted from the ISAAC protocol which was made appropriate for the age group studied. Completed questionnaires and information from medical records were compared, and the agreement was analysed by Kappa statistics and proportional agreement.

Results

Agreement was excellent for questions reporting current information such as doctor-diagnosed asthma (kappa=0.88), whether or not the child had had an allergy test (kappa=0.82), and use of antibiotics (kappa=0.81). The agreement was good for questions concerning doctor or hospital treatment for asthma (kappa=0.59), medication for asthma (kappa=0.58), symptoms of eczema (kappa=0.56), medication for allergic disease (kappa=0.45), and past infections (kappa=0.53).

Conclusions

Questions on asthma diagnosis, allergy testing, and use of antibiotics were reliable. Questions on medical treatment for eczema, allergic rhinoconjunctivitis and infections were less reliable, representing a potential source of information bias and possible misclassification.

5.4 Review of paper IV

Background

There are ambiguous results regarding the role n-3 polyunsaturated fatty acids (n-3 PUFAs) and fish might play in primary prevention of allergic diseases. The aim was to investigate the association between cod liver oil and fish consumption during pregnancy and the in first year of life and asthma and eczema at 2 years of age.

Methods

From the Prevention of Allergy among Children in Trondheim study (PACT), a prospective birth cohort study in primary health care in Trondheim, Norway, 3086 children were followed prospectively from 1 year to approximately 2 years of age.

The primary outcome variable was parental reported asthma and eczema at 2 years.

Results

Mean age for introducing fish in the diet was 9.1 months. Excluding children with incident eczema before 1 year, a reduced risk of developing eczema was found if the

child was eating fish once a week or more, adjusted odds ratio (aOR) for any kind of fish 0.62 (CI 95% 0.42 to 0.91 p= 0.02), for oily fish, aOR 0.21 (CI 95% 0.05 to 0.86 p= 0.03), for lean fish, aOR 0.67 (CI 95% 0.41 to 1.08 p= 0.10). The associations between maternal diet and eczema at 2 years and between the dietary factors and doctor-diagnosed asthma were all insignificant.

Conclusions

Fish consumption in infancy was more important than maternal fish intake during pregnancy in preventing eczema in childhood. The intake of fish *per se*, not specifically n-3 PUFAs, was most important in preventing eczema.

6 General discussion

6.1 Methodological considerations

A result of a non-randomised trial may reflect the true effects of the intervention on the exposure or on behaviour and subsequently the incidence of disease under study. The result may also have alternative explanations, such as chance or random error or as a result of systematic error or bias.

6.2 Validity

Validity refers to the ability of variable estimates to reflect, on average, what they are intended to reflect. The most common reasons for invalid estimates for variables relating exposure to disease are sample selection bias, information bias, and confounding. Validity can be divided into “internal” validity, and “external” validity. In general, internal validity corresponds to making correct inferences about the study population. External validity refers to making correct inferences about other populations (generalisability)[104].

6.3 Internal validity

Internal validity, in essence, is whether the study’s findings result from the intervention being studied, and are not due to chance or some other factor. Internal validity is how well the study was set up and executed to prevent confounding, selection bias, and information bias.

6.3.1 Study design

Several study designs were considered when planning the study. One option was to select another city in Norway as control. In such a design it would be difficult to adjust for climate, pollution, ethnicity and education, and the investments in infrastructure would be costly, therefore it was abandoned due to cost and lack of resources. A second option was to divide Trondheim in two parts; a control and an intervention district. This would lead to a problem with migration of participants and health workers, and a public and community-based intervention including the entire primary health care in the municipality, as in this study, would be impossible to implement without contaminating a co-existing control cohort. A randomised study on individual level would have the same problems with contamination of the intervention measures to the control cohort.

The choice was therefore a consecutive cohort design with a one-year difference between the control cohort and intervention cohort. A controlled non-randomised design is appropriate to provide relevant data for testing costs in a limited-resource environment, and to enable an evaluation of how the intervention measures were implemented by typical primary health care professionals in daily clinical work in a real-life setting. The effectiveness of new interventions can be monitored when implemented in a large scale in a real life setting. Using an observational design with a comparison group may allow plausibility statements to be made. Non-randomised designs can supply the evidence-based public health practice literature with data regarding implementation of interventions in ordinary public health that randomised controlled trials cannot[105].

The consecutive cohort design with a one-year difference between the control cohort and intervention cohort might have biased the results toward a better effect of the intervention as a consequence of possible time trends. Particularly tobacco smoking could be subject to this, as there was a decline in smoking prevalence among pregnant Norwegian women in the current period[106]. Such insecurities probably cannot be completely avoided in a large-scale, real-life prospective study setting. This design also ensured high conformity between the cohorts regarding population size, race/ethnicity, maternal educational level, income, environment, urbanisation and social characteristics[107].

6.3.2 Choice of questions

Use of questionnaires is an essential epidemiological tool. Epidemiological findings are often based partly or completely on responses to questionnaires. We used questionnaires to collect information on exposures, outcomes, modifiers and confounders.

6.3.3 Life-style questionnaires

Information on exposure modifiers and confounders was collected by questionnaires completed mainly by mothers at inclusion in the study, and at 6 weeks, 1 year and 2 years after birth of their child. Validated questionnaires covering the three interventional topics were not available at the time, and questions were adapted from various sources[12,98-100]. Parental smoking during pregnancy was assessed with two questions in which the women were asked if they or their partner were smoking at the

start of the pregnancy, if they were smoking now and their daily and/or weekly cigarette consumption. A separate question was asked about the total number of cigarettes smoked indoors. If the answers to all questions on smoking were missing they were coded as missing.

Housing conditions and indoor dampness was assessed with one question asking for eight different indicators on indoor dampness, such as mould or musty smell, moist cardboard and newspapers after storage, dew on windows, moist spots on ceilings, walls or wallpapers, leakage detected on water pipes or taps, leakage from roof or ground, or moisture in floors. If "yes" to any question, the follow-up question was whether the problem was repaired. Alternatively the answer could be "no" to all.

Information on consumption of vegetables, cod liver oil, lean fish (cod and coalfish) and oily fish (redfish, halibut, salmon, trout, herring and mackerel) as meals and sandwich spread were collected by using a set of validated semi-quantitative food frequency questions with six categories: never, less than once a week, once a week, twice a week, three times a week and four times a week or more. A limitation of the food frequency questions was that total daily energy intake could not be derived from the collected data. Not adjusting for energy intake may be a limitation in nutritional epidemiology (Paper IV)[108]. The questionnaires covered a wide range of modifiers and confounders.

The questionnaires did not cover parental alcohol consumption. This was a deliberate choice as we feared questions on alcohol would reduce the acceptability and thereby reduce the participation rate[109].

6.3.4 Additional study

Educational data and data on socioeconomics were by accident left out. Maternal and paternal education was not accounted for in the original questionnaires. Thus 1189 randomly-selected parents answered questions on education, either written or by telephone interview. We also used homeowner status as a proxy for socioeconomic status in the regression analysis (Paper I, II and IV).

6.3.5 Health questionnaire

No validated questionnaires to assess the prevalence of risk factors and incidence of asthma, rhinoconjunctivitis and eczema/dermatitis among children between 2 and 6

years were found when we planned the PACT study. We searched for Validity, and Reliability of questionnaire on atopy and allergy among children (Medline and Cochrane search). Most of the existing literature was about variation of the International Study of Asthma and Allergies in Childhood (ISAAC)[7]. ISAAC is an international project aiming to determine the prevalence of asthma, allergic rhinitis and eczema in children living in different countries. The written questionnaire includes questions on respiratory and skin symptoms. However, ISAAC was constructed for and applies to older children, not for children aged 2 years. To evaluate the effect of the intervention, existing questionnaires from the ISAAC protocol had to be revised for the actual age group in this study.

Three main requirements were specified in developing the questionnaire: First, the extent of the questionnaire should be sufficient to estimate symptoms and complaints consistent with asthma, rhinoconjunctivitis, and eczema/dermatitis, and to describe use of health care services and treatment for these diseases. Second, it should be possible to complete the questionnaire during a maternal and child health centre consultation of average duration, i.e., 30 minutes. Third, it should be designed to obtain satisfactory validity.

6.3.6 Acceptability of questions

A brief questionnaire to determine feasibility and time consumption was completed by 36 participants in a pilot study. The median time spent completing the questionnaire was 6.5 minutes (range 1–15 minutes). About half the participants (18 out of 36) managed to complete the form while waiting for the maternity centre consultation, the rest completed it after the consultation. Six parental couples were invited to comment on the design and comprehensibility of the questionnaire in a modified focus group evaluation. Comments on the extent and comprehensibility were collected from this group. This evaluation led to rephrasing of some questions. Overall there were few comments and proposals for amendments (Paper III).

6.3.7 Precision/Accuracy

When measuring health-related phenomena in an epidemiological study, it is important to achieve the highest levels of precision and accuracy. Precision refers to the degree to which there is variation in a measurement. Accuracy refers to the degree to which the measurement is, on average, correct. If each time a phenomenon is measured, the result

is the same, but all measurements are far away from the true value, there is high precision but low accuracy. If measurements vary widely, but their average is close to the true value, there is accuracy but not precision.

6.3.8 Validity and reliability of the questionnaires

The focus group discussions might be seen as constructing validity, as the discussions were also about what the question was really about. On the other hand, the major effort in the focus group was to challenge the parents on what their understanding was of the questions so that they would be able to give the same answer each time. Simultaneously, we compared information from the questionnaire on the chosen items and corresponding information from medical records to estimate whether the information was reproducible from other sources, not whether it was repeatable. In contrast with validity studies, reliability studies assess the extent to which results agree when obtained by different approaches. The medical records could not be viewed as a reference standard and that is why we find it more appropriate to use the term reliability (Paper III)

6.3.9 Confounding

Three conditions are traditionally given as necessary (but not sufficient) for a factor to be a confounder[110]. First, a confounder is a factor that is predictive of disease in the absence of the exposure under study. A confounder need not be a genuine cause of the disease under study, but merely “predictive”. Hence, surrogates for causal factors (for example, age and socioeconomic status) may be regarded as potential confounders, even though they are not direct causal factors. Second, a confounder must be associated with exposure in the source population at the start of follow-up (that is, at baseline). Third, a variable that is affected by the exposure that is an intermediate in the causal pathway between exposure and disease should not be treated as a confounder because to do so could introduce serious flaws in the inference of the results. We identified confounding factors by *a priori* knowledge. Maternal age and child’s sex were obvious confounders and were adjusted for in all analyses. Parietal status, atopic predisposition and parental smoking habits were also considered to be confounders, and they were tested in several models and used in some statistical analyses (Paper I, II and IV). One obvious confounder was by accident missing in our data; socioeconomic status. As a proxy for socioeconomic status we adjusted for homeowner status (Paper I, II and IV).

Pets in the household are used as a confounder in many epidemiological studies on allergy. We did not use pets because, as far as we can see there is no association between the exposures under study and pet-keeping, a criteria that must be fulfilled if pets should be considered to be confounding (Paper I, II and IV).

6.3.10 Reversed causality

Effect modification of diet, or reverse causation, would occur if early signs of allergic disease in children influenced the introduction of different foods, such as fish, in the children's diet. The onset of eczema commonly occurs very early in life when decisions related to continued breastfeeding or introduction of food items are being made; introducing the possibility of effect modification. To address this possibility, we used parent-reported allergic disease at 1 year of age in a stratified analysis. The associations between dietary factors at 1 year of age and reported allergic disease at 2 years of age were then tested in two steps in order to avoid effect modification of diet, in the second step children whose mothers reported allergic disease at 1 year of age were excluded (Paper IV).

6.3.11 Bias

6.3.11.1 Selection bias

Selection bias is an error in choosing the individuals or groups to take part in a study, i.e., different inclusion of controls and cases. Ideally, the subjects in a study should be very similar to one another and to the larger population from which they are drawn (for example, all individuals with the same disease or condition). If there are important differences, the results of the study may not be valid.

6.3.11.2 The non-participant study

To investigate if there was a selection bias among participants in the PACT study we conducted a non-participant study, where 391 parents who consecutively visited maternal postnatal care were asked to complete a short and anonymous questionnaire on age, socioeconomic status, allergic disease and smoking behaviour, regardless of their participation in the PACT study. The non-participant study showed no selection bias for participants in the PACT study regarding age, socioeconomics, allergic disease, or smoking behaviour.

6.3.11.3 Recall bias and misclassification

Recall bias relates to different recall of information or exposure in cases that have experienced an adverse outcome (having a child with asthma, eczema or ARC) and those who have not. Recall bias may have occurred and led to misclassification because parents who had children with one of the diseases under study were more likely to remember or report a particular exposure during pregnancy or during infancy because the exposure could be more meaningful to cases than to controls. Parents who were smoking could be more likely to under-report smoking if their child had asthma, or the reporting of a child's diet could be influenced if the child developed eczema early in life. The outcome variables were also vulnerable to misclassification, which is inevitable in most studies. The consequence of this type of bias depends on whether the misclassification is non-differential (random) or differential (not random).

6.3.11.4 Non-differential misclassification

Non-differential misclassification of exposure occurs when misclassification is not related to the disease status, and misclassification of disease status is non-differential if exposed and non-exposed people are equally likely to be misclassified according to disease status[110]. Under-reporting or selective memorisation could have led to misclassification of exposure variables. If this misclassification of exposure variables were the same in the study groups, the effect of this random misclassification would have minimised the differences between the groups, and resulted in an underestimation of the true effect (paper I, II and IV). Maternal food intake during pregnancy and the children's diet during infancy were retrospectively assessed when the children were 1 year of age, and therefore vulnerable to recall bias and misclassification of exposure. Misclassification of lean and oily fish may also have occurred. To avoid misclassification, different species of fish in each group were exemplified in the questionnaire. It is reasonable to believe that random misclassification has occurred and as a result weakened the observed associations between eating fish and reduced prevalence of eczema at 2 years (Paper IV).

Having a child is perhaps one of the greatest events in anyone's life. The recall ability is related to the significance and meaningfulness of an event, hence mothers can recall their diet in pregnancy with some accuracy[111]. This has probably minimised the recall bias in Paper IV.

6.3.11.5 Differential misclassification

The recall and reporting of a socially stigmatised exposure, like cigarette smoking during pregnancy, may have been affected. The intervention group (Paper II) were more aware of the aim of the study, and hence non-random or differential misclassification may have occurred and brought the risk estimate towards nil.

6.3.12 Participation

6.3.12.1 Participation rate

Thirty two of 35 general practices (104 general practitioners), all seven community-based midwives and all 20 maternity health centres in Trondheim participated in the PACT study. In the cross sectional control cohort the participation rate varied from 49% to 64% for the different age groups. During the inclusion period some 8400 pregnant women in Trondheim were eligible to the intervention cohort, 2860 women were included. This gave a participation rate of about 34% in the intervention cohort. The discouraging participation rate was a consequence of low inclusion activity among many GPs and midwifes, and was not a consequence of self-selection among women. There is no reason to assume a selection bias, as confirmed by results from the non-participant study which included 391 subjects.

6.3.12.2 Loss to follow up

Of the 3839 women who were included during pregnancy (Paper II), 2132 (56%) answered the questionnaire at 6 weeks after the birth. This is a high loss to follow-up, and was due to forgetfulness or failing routines for follow-up among the health professionals. One would also expect a certain degree of exhaustion among GPs and midwives in a study of such duration[112]. If the loss to follow-up is assigned to forgetfulness or low attention during follow-up both among participants and health professionals, it may be assumed that the participants are lost at random. This is supported by the observation that baseline characteristics between drop-outs in the two cohorts differed only for single mothers. If so, even a loss to follow-up of 60% is shown not to represent important bias[113]. Importantly, we had almost no active withdrawals in either of the cohorts.

6.4 External validity

External validity, or generalisability, involves the extent to which the results of the PACT study can be generalised to a larger group of subjects, for example, women or children living outside Trondheim (Paper I, II–IV). There are several threats to external validity; the most important is perhaps the participants under study. Are the participants in PACT representative of pregnant women in Trondheim and other parts of Norway? The PACT study comprises approximately 34% of the eligible women in Trondheim and, as described under the section "Participation", we claim this is a representative sample of women and children living in Trondheim.

Comparing data from PACT with MBR data for all pregnant women in Trondheim, we found no difference in the prevalence of smoking at the start of pregnancy before the intervention commenced in 2002. This strengthens our belief that the PACT population is representative for pregnant women in Trondheim. There is, to our knowledge, no good evidence to indicate that pregnant women in Trondheim differ from pregnant women in other large cities in Norway, but such differences cannot be ruled out.

The large unselected population in PACT also makes it possible to generalise results from dietary and housing dampness intervention (Paper I), and the association found between fish consumption at 1 year and reduced risk of eczema at 2 years (Paper IV).

7 Discussion of main findings

7.1 Behavioural changes and changes in exposure

7.1.1 Smoking intervention

A significant and stable decline in maternal and paternal smoking frequencies was reported from the start of pregnancy, through 6 weeks postnatal, and at 1 and 2 years postnatal. The smoking frequency was almost halved at all four assessment points of time. The significant differences in parental smoking prevalence between the cohorts could not be ascribed the intervention directly, but were most probably due to time trends in the study period, as shown by the trend analysis in the control cohort. When we performed a stratified analysis according to smoking behaviour at the time of inclusion in the study, we observed no impact of the smoking intervention during pregnancy. The high quitting rate observed in both cohorts (approximately 70%) was apparently due to spontaneous quitting before inclusion. Therefore only a hardcore of resilient smokers were left for the intervention programme, women who had made their choice to continue smoking during pregnancy probably despite knowledge of the harmful effects and social stigma. This is in agreement with results from several other smoking intervention studies in pregnancy[114,115]. We found a very high rate of spontaneous quitting in the intervention cohort compared with what has been found in other studies[114,116]. This result was confirmed when we analysed the MBR data for Trondheim, Bergen and Norway (Figure 2 in Paper II). The MBR data for Trondheim comprise both women participating in the PACT study and non-participating women. The women in the two cities had been exposed to the same national legislation and anti-smoking campaigns. What differed between the two cities were the PACT study and the fact that the intervention programme was adopted as an integrated part of the recommended maternity care life-style counselling programme throughout Trondheim.

One interpretation may be that the PACT study in this way increased the attention on the health hazards of smoking in pregnancy among GPs and midwifes, and also among the parents-to-be, and in this way brought about the significantly higher smoking cessation rate observed in the MBR data for Trondheim compared with Bergen. This may have been facilitated by the supplemental attention on smoking behaviour the PACT study initiated in Trondheim, and thus the PACT study may have reinforced the national anti-smoking campaigns which took place during the study period. The

intervention, in this way, might have influenced the results on the macro level in Trondheim, but no impact on pregnant women when comparing the two cohorts was observed. A 10%–20% false-negative rate has been reported to exist among women who report quitting smoking early in their pregnancy[114]. Social awareness following the increased attention about the hazards of smoking during pregnancy, and the implementation of a new law banning smoking in restaurants coinciding with the initialisation of the intervention, may have facilitated a higher false-negative rate of reporting quitting in the intervention group. Accordingly, the far better smoking cessation rate among pregnant women in Trondheim compared with Bergen and Norway during 2002–2004 could be explained by differences in false-negative rates. We also found a very low prevalence of reported indoor smoking in both cohorts. This may indicate that there was awareness in both cohorts of the harmful effect of SHS on small children, but answering according to social desirability may also explain this result.

7.1.2 The dietary intervention

The dietary intervention was for mothers to take cod liver oil supplement and to eat oily fish twice a week during pregnancy, and to add cod liver oil to the children's diet from 4 to 6 weeks of age. Oily fish should be introduced into the children's diet from 6 months of age. We did not intervene on intake of vegetables, breastfeeding, formula or other dietary factors.

During pregnancy, the numbers taking cod liver oil more than four times a week increased significantly in the intervention group compared with the control group. The women also ate oily fish and lean fish more often during pregnancy in the intervention group compared with the control group, and there were no time trends regarding cod liver oil, fish and vegetable intake during pregnancy either in the intervention group or the control group.

Among the children we found that a statistically significant higher proportion took cod liver oil at least four times a week in the intervention cohort at 1 and 2 years of age. The proportion having oily fish at least once a week was substantially higher at 1 year and 2 years of age in the intervention group compared with the control group, and there was a positive trend for eating oily fish in both groups at 1 and 2 years of age. There

was a statistically significant difference in the intake of lean fish between the groups, both among 1 year olds and 2 year olds. The intake of any kind of fish was larger at 1 year of age in the intervention group, but at 2 years of age the difference was no longer statistically significant. An interpretation of this may be that oily fish was substituted for lean fish in the children's diet. We did not observe any difference between the cohorts regarding intake of vegetables.

The frequency of breast feeding at six weeks did not differ between cohorts, while the proportion of mothers who reported, at 1 year postpartum, having breastfed exclusively for more than 4 months was significantly higher in the intervention cohort. We therefore conclude that the dietary intervention was successful; we observed a desired increase in intake of cod liver oil and oily fish, and no or minor change in intake of the dietary factors not intervened upon.

7.1.3 Housing dampness intervention

The reporting of indoor dampness was approximately 4% and was constant over and within the groups at 6 weeks and 1 and 2 years of age. The indoor housing dampness intervention resulted in no measurable effect in lowering the housing dampness in the intervention group. We found, however, a strong consistency in the reporting of indoor dampness, both over time and between the groups. This consistency might be interpreted as the questions used on housing dampness in the "Risk factor questionnaires" were repeatable and hence reliable.

7.1.4 Conclusion of interventions

The interventional programme was structured, repeated, multidisciplinary, and implemented within the framework of ordinary primary health care. Smoking behaviour was initially recorded and only families where mother or father smoked were offered smoking intervention. Dietary intervention and intervention on housing dampness were given to all families. Why did the intervention lead to a change in behaviour as regards intake of cod liver oil and oily fish, but no change in behaviour leading to reduced housing dampness or smoking?

One explanation may be that the health workers, especially the health visitors, were familiar with and accustomed to informing mothers about diet during pregnancy and infancy. Indoor climate and housing dampness was a new issue for most of the health workers, however, and we also observed a small resistance against this topic amongst the health workers. The smoking intervention, too, was apparently a topic most health workers were already informing parents about, with success. The time trends were so strong, however, that it was difficult to measure any effect of the intervention.

In conclusion, structured interventional programmes can be adapted and implemented within the framework of ordinary primary health care. Different health professions in primary health care can cooperate to bring about pre- and postnatal changes in life-style and risk/protective behaviour to reduce assumed risk for allergic disease in childhood.

7.2 Reliability of questionnaire

We chose to test the reliability of the questionnaire by comparing the parents' answers with the information retrieved from medical records. This method has been widely used for both reliability testing and for validating questionnaires in other medical conditions, but to our knowledge, when we started, not for the diseases investigated in this study [117,118]. However, a similar approach to the one we used was used for comparison of clinically-diagnosed asthma with parent-reported doctor-diagnosed asthma in children aged 1–6 years in a Swedish study published in 2006[119]. ISAAC-based questions were also used in this questionnaire and the authors found that the written questionnaire was able to find 54% of the children with a medical record of asthma. The sensitivity of the questionnaire was 77%, the specificity was 97.5%. The prevalence of asthma was the same whether it was based on the written questionnaire or medical records, but nearly half of the individual asthmatics identified using the two approaches differed. Our approach was to look at agreement between medical records and parent-reported answers, not only for asthma, but also for other questions about which we could expect to find information in medical records. A first prerequisite for a correct classification of reported disease endpoints is that the information given is reliable. Diagnosis of atopic diseases such as asthma, eczema and ARC are based on the medical history, repeated consultations and knowledge of the child's family and living conditions. As medical records give an overview of all contacts in primary and specialist care over time,

diagnosis of atopic diseases is probably best based on such information. We found excellent agreement for questions reporting factual information, such as if the child has had an allergy test and has been prescribed antibiotics together with specific diseases or doctor's diagnosis of asthma. The latter is in accordance with findings in the Obstructive Lung Disease in Northern Sweden Study (OLIN study), where the same question was evaluated[18]. Also, in an another study that reliability tested questions on asthma, allergic rhinitis, and conjunctivitis in a Finnish questionnaire, the findings were similar[99]. The potential for classification errors, however, was considerable for questions on using treatment for skin rash or eczema, any medicines for allergic disease, and whether the child has been treated by a doctor or has been hospitalised for allergic disease/complaints. The most important issue was to distinguish between the information based on the parents' opinions and experience and the information they have shared with and/or received from the health services on any level. Still, the deficiencies in the communication and in the understanding between parents and medical staff, and the shortcomings in updating the medical records, would impair the agreement. Knowledge of the agreement is, however, important as inferences of research results should include the possibilities of misclassification.

Using medical records as a "reference standard" for disease prevalence is, however, only satisfactory provided physicians apply diagnostic criteria correctly. Whether the doctor-diagnosed diseases meet the standard criteria for the current diseases, and thereby the validity of the questionnaire, was studied in a separate endpoint and validity study (Paper III) The validity of answering "yes" to both questions: "Has your child ever had eczema?", and "Has your child ever had an itchy rash which was coming and going for at least six months?", compared with atopic dermatitis diagnosed by the UK criteria was estimated as sensitivity and specificity. The combination of "yes" to both questions had a sensitivity of 69.4% and a specificity of 88.7%[120]. We found that the agreement between information given by the parents in the form and information obtained by examining medical records was good to excellent for the questions estimating prevalence of disease. The questionnaire may possibly underestimate the use of anti-allergic medication, as well as doctor's treatment for allergic disease. No question was overestimating the prevalence of allergic symptoms or medication use and we conclude that the new questionnaire was both reliable and valid for estimating the prevalence of the allergic diseases under study.

7.3 The association between fish oil and fish consumption and eczema and doctor-diagnosed asthma at two years

In this present study we found a rather indifferent effect of maternal fish and cod liver oil intake during pregnancy on allergic disease in their offspring, and we observed no dose-response relationship. Previous studies have found that increased maternal intake of fish during pregnancy has a protective effect against the development of allergic diseases in their offspring[59,64]. However, Calvani et al. and Sausenthaler et al. did not account for the infant's diet during the first year of life. We found a strong correlation between maternal diet during pregnancy (fish, vegetables and cod liver oil) and the infant's diet at 1 year of age. Therefore, inferences on associations between maternal diet during pregnancy and subsequent development of allergy in offspring must be taken with caution as long as the infant's diet is not accounted for.

We found that the associations between cod liver oil intake during early childhood and any allergic disorder at 2 years of age were insignificant and inconsistent. Our results are in line with a large randomised controlled trial to test modification of n-6/n-3 dietary intake in the first five years of life on children with a family history of asthma. The investigators were successful regarding change in the children's plasma n-6/n-3 ratio, but no effect on the prevalence of asthma, wheezing, eczema or atopy was found[63]. A Cochrane review also lends meagre support to the hypothesis that marine fatty acids have an allergy-protective effect[61]. This review did not address the issue of whether consumption of fish *per se* may improve asthma control due to some active component in fish other than fatty acids.

When modification due to disease (or reverse causality) was accounted for, we found a strong and consistent negative association between fish intake early in life and parent-reported eczema at 2 years of age. The association was strongest for oily fish, but also statistically significant for any kind of fish. The association between lean fish and reported eczema was statistically insignificant. We observed no association between cod liver oil or oily fish and doctor-diagnosed asthma at 2 years. Our findings indicate that components in fish other than n-3 PUFA should be considered when seeking possible mechanisms in preventing allergic disorders. Fish constitutes important nutrients other than n-3 PUFAs, such as proteins (rich in essential amino acids), vitamins (A, D and B_{12}), minerals (selenium and iodine), and trace elements beneficial

for children’s development. Perhaps a combination of n-3 PUFAs and unknown factors that we find especially in oily fish is necessary to achieve a protective effect. Equivalent to this hypothesis may be the findings in basic research and observational studies that have suggested that vitamin E or vitamin C may reduce the risk of cardiovascular disease. However, given as synthesised or extracted supplementation in randomised clinical trials, neither vitamin E nor vitamin C supplementation has shown a reduction in the risk of major cardiovascular events[121]. Is it best for human beings to eat natural foodstuffs? Eating natural food gives access to other components than those extracted and given as supplements. From our results, we cannot rule out that n-3 PUFAs reduce the risk of asthma and eczema, but our findings certainly justify a search for other allergy-protective components in fish beyond n-3 PUFAs – either factors that have a protective effect themselves or in combination with n-3 PUFAs.

8 Conclusions

Primary prevention to reduce risk factors for allergic diseases is possible in the frame of ordinary primary care, but there are some constraints. Given that the interventional topic is familiar to the health worker, as is the dietary intervention, it is possible to change behaviour, but when it comes to more unfamiliar topics like, for instance, indoor dampness; it seems difficult to change behaviour. The smoking intervention coincided with very strong time trends in smoking cessation, seven out of ten women stopped smoking early in pregnancy and few and perhaps just the most resilient smokers were left to intervene on. We observed no impact of the smoking intervention programme in pregnancy on the individual level, but the intervention may have contributed to a very high smoking cessation rate during the intervention period among the whole group of pregnant women in Trondheim, regardless of participation in the PACT study. The intervention programme may have given an additional impact to the legislation and national anti-smoking campaigns that took place during the study period. To achieve reduced smoking during pregnancy on a community level it seems important to maintain a "social" stress both through national and local anti smoking campaigns. On the other hand, on the individual level new approaches must be developed for the resilient pregnant smokers who do not quit despite the increasing social stigma.

The questions we used to assess allergic disease among 2 year olds were reliable and no responses to questions were overestimating the prevalence of allergic disease. There is, however, a possibility that the responses to questionnaire underestimated the use of anti-allergic medication and doctor's treatment for allergic disease.

Consumption of cod liver oil and oily fish during *pregnancy* showed no association with reported eczema or doctor-diagnosed asthma in 2 year olds. Neither was intake of cod liver oil during *infancy* associated with reported allergic diseases at 2 years. Any kind of fish, and especially intake of oily fish at *one year of age*, however, showed a strong and consistent negative association with reported eczema at 2 years of age. We hypothesise that there may be some allergy-protective components in fish other than or in addition to n-3 PUFAs that act either alone or in combination with n-3 PUFAs. Our findings certainly justify searching for this unknown component.

9 Further research

9.1 Within PACT

Further research in PACT will first focus on the effectiveness of the intervention on the incidence of disease and sensitisation, first assessed at 2 years, then at 6 years of age.
As mentioned in the introduction, the design of the PACT study is well suited for conducting sub-studies, and two sub-studies are ongoing. The IMPACT study can supply new information on aetiological factors and pathogenetic mechanisms in allergic diseases, in particular, in respect to the relationship between microbial exposure early in life, immunological development and allergic disease. These results can subsequently be used in designing new prophylactic strategies in primary prevention of asthma, eczema and rhinitis.

The other sub-study, the probiotic study in PACT (ProPACT) intends to test earlier findings that probiotics has a substantial clinical effect on eczema, but no effect on sensitisation. This study will provide new insight in the possible underlying immunological or anti-inflammatory mechanisms regulating the prevalence of eczema.

9.2 Other questions to be solved outside PACT

The ISAAC study has documented considerable variation in disease prevalence between east and west, rural and urban areas, the poor and the rich[5,7]. The risk factors investigated so far do not have a geographic or socio-economic presence to explain these differences in allergy prevalence. This necessitates a search for new or lost environmental factors, distributed in a way that can explain these variations in disease prevalence[2,5,8].

How does immunity develop in new-borns and infants? What are the gene/environment interactions? What might be the determinants and critical periods for this development? How might the relationship between certain exposures and immunological development influence the prevalence of allergic diseases[122]? The PACT study may give answers to some of these questions, but many have to be solved outside the PACT study and sub-studies.

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11 Paper I-IV and appendices

Paper 1

A primary health-care intervention on pre- and postnatal risk factor behavior to prevent childhood allergy.

The Prevention of Allergy among Children in Trondheim (PACT) study.

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Abstract

Background

This study aimed to evaluate the impact of a primary prevention intervention program on risk behavior for allergic diseases among children in a pre- and postnatal primary healthcare setting.

Methods

The Prevention of Allergy among Children in Trondheim, Norway (PACT). study invited all pregnant women and parents to children up to 2 years of age in the community to participate in a non-randomized, controlled multiple life-style intervention study aiming to increase dietary intake of cod liver oil and oily fish for women during pregnancy and for infants during the first 2 years of life, to reduce parental smoking and to reduce indoor dampness. A control cohort with "follow up as usual" was established before the intervention cohort. Questionnaires were completed for both cohorts in pregnancy, 6 weeks after birth and when the children were 1 and 2 years of age. Trends in exposure and behavior are described.

Results

Intake of oily fish and cod liver oil increased statistically significantly among women and infants in the intervention cohort compared to the control cohort. There was a low postnatal smoking prevalence in both cohorts with a trend towards a decreasing smoking prevalence in the control cohort. There was no change in indoor dampness or in behavior related to non-intervened life-style factors.

Conclusions

The dietary intervention seemed to be successful. The observed reduced smoking behavior could not be attributed to the intervention program, and the latter had no effect on indoor dampness.

Background

A parliamentary bill was presented in 1997 to initiate preventive measures against the rising incidence of asthma, allergy and eczema among Norwegian children during the last decades. Trondheim was chosen to develop, implement and evaluate relevant prophylactic measures in collaboration between the political and medical authorities in the community and the Norwegian University of Science and Technology (NTNU). Such interventions should be transferable to other communities for implementation in primary health care without extra cost or time-expenditure. The recognized adjuvant factors of dietary N-3 polyunsaturated fatty acids (N-3 PUFAs) [1,2] smoking and environmental second hand smoke (SHS) [3,4], and indoor dampness [5,6] associated with morbidity and severity of allergic disease were chosen as interventional topics. An applicable and structured interventional program for simultaneous intervention on all three factors was then developed. A primary assignment was to find out to what extent pregnant women and parents would comply with the behavior recommendations in the intervention program when implemented in a real-life setting. Thus the study aimed to evaluate the impact of a primary prevention intervention program on risk behavior for allergic diseases among children in a pre- and postnatal primary healthcare setting in Trondheim, Norway.

Methods

Study population

In 2000 the PACT study was initiated as a cohort study in primary health care in Trondheim, Norway, a community of 165 000 inhabitants and approximately 2100 deliveries per year. Prophylactic measures to induce behavioral changes regarding tobacco smoking, consumption of cod liver oil, oily fish, and indoor dampness were developed in collaboration between general practitioners (GPs), midwives, public health visitors and parents using a Delphi

technique[7]. In all, 32 of 35 general practices (altogether 104 GPs), all seven community based midwifes and all 20 maternity health centers in Trondheim agreed to participate. Admission to a control cohort to monitor changes and trends in lifestyle and diet habits and trends in incidence of allergic diseases started in September 2000. These women had a "follow up as usual". All women who received an invitation and gave written informed consent to participate were included in the study with no further selection criteria. Yearly cohorts of pregnant women, children at 6 weeks, 1 year and 2 years of age were recruited consecutively until recruitment to the intervention started for the actual year-group, and the last 2 year old was included in December 2004. Information on risk factors and life-style were collected in parental self-reported questionnaires in ordinary consultations during pregnancy, 6 weeks after birth and at scheduled check-ups at 1 and 2 years of age. End points such as allergic disease together with a health inventory were completed in separate questionnaires at 2 and 6 years of age[8].

Recruitment to the intervention cohort started in June 2002, with all participants included by GPs and midwifes during pregnancy. Inclusion criteria were as for the control cohort, with a follow up and data collection with the same questionnaires at the same ages as in the control cohort. This inclusion ended in June 2006. The collection of questionnaires at 2 years after birth was completed in March 2009. The data collection will continue until the children are 6 years old, providing cross-sectional data in both cohorts permitting estimates for trends in exposure, behavior and disease.

Interventional topics and strategies

Increased N-3 PUFAs to pregnant women and children was of considerable interest before the study started[1,2]. In Norway a daily supplement of cod-liver oil is very common and already recommended for children and adults alike. In the intervention program we aimed for a

dietary intake of N-3 PUFAs of at least two meals of oily fish a week and 5 ml cod-liver oil a day in pregnancy (5 ml cod liver oil = 1.2 g N-3 PUFA). Cod liver oil was to be introduced to the child from 4-6 weeks of age increasing to 5 ml/ day, and oily fish at least twice a week from 6 months of age as dinner or sandwich spread. We did not intervene on intake of vegetables, breastfeeding, formula or other dietary factors.

Reduced SHS exposure was chosen, recognizing the harmful effects of tobacco smoke exposure to pregnant women, mothers and small children as a generally accepted and avoidable risk factor[9,10]. The group adapted a clinic-based brief "5A" office intervention based on the "A Clinical Practice Guideline for Treating Tobacco Use and Dependence"[11,12].

Reduced indoor dampness was chosen as the relatively cold and humid climate in central Norway predisposes to high indoor dampness and because the scientific basis for an intervention on indoor dampness was well founded when the study started [13,14]. The interventional strategy provided advice on how to detect, and advice on how to reduce indoor dampness and its consequences: Simple advice regarding inspection of signs of dampness as damage due to moisture on walls and floors, mould and/or musty smell, and solutions such as simple ventilation by opening windows regularly and avoiding drying of clothes in living rooms were recommended.

Implementation

In Norway the normal schedule at the time constituted of 8-10 prenatal consultations with a GP or midwife from week 8-10 in pregnancy followed by 10 postnatal consultations with public health visitors at maternity care centers during the child's first year of life. Thereafter the schedule was to see all children at 15 and 24 months. Children regarded at risk for disease were seen more often. The intervention program was implemented as the recommended

maternity care life-style counseling program throughout the city, regardless of participation in the PACT-study or not. The officially recommended time-schedule for primary care pre- and postnatal follow-ups in Norway was followed for both cohorts. This program was accessible and recommended for all women, free of charge, and with a nation-wide attendance rate of nearly 100 % in both urban and rural areas. The interventions were repeated at scheduled consultations throughout pregnancy until 2 years postnatal, either simultaneously or sequentially, at least five times for each topic both pre- and postnatal, assuming no extra time expenditure. All participating GPs, midwives and nurses were offered a course on the interventional program and strategies, including a three hours course on smoking cessation and relapse prevention to ensure a consistent intervention and improve on possible low self-confidence in life style counseling skills [15]. Written guidelines, including self-help material, were distributed to all primary care health professionals and the intervention was designed to be the best of one's ability be delivered as an integrated part of ordinary maternity care in a personalized and individually adapted way, based on possible former knowledge of the family in question. The intention was to obtain awareness, agreement, adoption and adherence to the interventional topics both for health professionals and recipients. Interference with the health professionals and participants from the study-group was limited to what might have been expected from officials in ordinary clinical practice. In accordance with this there was no monitoring of the implementation of the intervention program activity among the health professionals in the intervention group.

Questionnaires

Exposure variables

Validated questionnaires for the actual age-group were not available at the time, so questions were adapted from various sources [16-21]. Information regarding age for introduction of a

variety of food products, including different kinds of porridge, bread, vegetables, fruit, commercially produced baby dinner, homemade baby dinner, fish, cows' milk, and eggs were obtained when the children were 1 year of age. Duration of breastfeeding, time for introduction and type of infant formula, vitamins and cod liver oil, information on housing conditions, parental smoking at start of pregnancy and 1 year after birth, indoor smoking, and pregnancy related complications were collected. Information on consumption of vegetables, cod liver oil, lean fish (cod and coalfish) and oily fish (redfish, halibut, salmon, trout, herring and mackerel) as dinner and sandwich spread were collected by using validated semi quantitative food frequency questions with six categories: never, less than once a week, once a week, twice a week, three times a week and four times a week or more, and re-categorized later in the analyses[22,23].

Parental smoking during pregnancy was assessed with two questions where the women were asked if they or their partner were smoking at start of pregnancy, if they were smoking now and daily and/or weekly cigarette consumption. A separate question was asked about the total numbers of cigarettes smoked indoors. Smoking was coded as a dichotomous variable, if subjects were smoking more than one cigarette a week they were coded as smokers, if the answer was no they were coded as non-smokers, and if the answers to all questions on smoking were missing they were coded as missing.

Housing conditions and indoor dampness were assessed with one question asking for eight different indicators on indoor dampness, as mould or musty smell, moist cardboard and newspapers after storage, dew on windows, moist spots on ceilings, walls or wallpapers, leakage detection on water pipes or faucet, leakage from roof or ground, or moisture in floors. Dampness index was defined by the sum of reported dampness indicators with a sum ≥ 3 as cutoff.

Outcome variables

The questionnaire on health was completed when the child was 2 and 6 years old and adapted to our age group from ISAAC [24]. This questionnaire was tested for reliability in a separate study [25]. No biomarkers regarding nicotine, fatty acids or indoor dampness were used.

Non-participant study

To investigate if there was a selection bias in the PACT-study we conducted an additional non-participants-study where 391 parents who consecutively visited different maternal postnatal care centers were asked to complete a short and anonymous questionnaire on age, socioeconomics, allergic disease and smoking behavior, and if they were participating in the PACT-study or not.

Approvals

The Regional Committee for Medical Research Ethics for Central Norway approved of the study (Ref 120-2000). The study was granted a licence by the Norwegian Data Inspectorate to process personal health data and one of the parents signed a written informed consent formula (Ref 2003/953-3 KBE/-).

Statistical analysis

Reporting and analyses are presented according to recommendations in TREND [26]. To estimate a change in exposure before and after implementing the intervention program, parental reports on behavior both intervened and not intervened upon were compared. Population size in the intervention cohort was based on a prevalence of asthma among 6 years old children estimated to 5%. To identify a reduction in prevalence of 40 % or more, the population size had to be 2100 children (Alfa 0.05 and a power of 90%). With an expected 30% lost to follow up we needed to include 3000 children in the intervention cohort.

SPSS for Windows® ver.15.0 (Chicago, Ill. USA) was used for all statistical analyses. Cross-sectional data were collected for annual cohorts using questionnaires Q2, Q3 and Q4 (Fig. 1). With binary logistic regression models prevalence of exposure factors throughout the study period was used to estimate p for trend in both cohorts. Comparisons between the cohorts were tested with the Chi-square statistics for binomial data and independent t-test for continuous data. Confidence interval (CI) was based on binomial distribution for dichotomous data, and normal distribution for continuous data. Level of significance was set to $p = 0.05$, two-tailed. Comparisons between the cohorts were performed for women during pregnancy and breastfeeding and for children during first and second year of life.

Confounding factors were identified by *a priori* knowledge, and maternal age, parity, parental allergic disease and homeowner status were tested in several models and decided as the resulting set of covariates.

Results

Population

There were no differences regarding maternal age, gender, and birth weight between the cohorts. In the intervention cohort there were fewer primiparous and single women, they had somewhat longer education, fewer of the parents had allergic disease and there were more homeowners (Table 1).

Behavioral changes

The dietary intervention

During pregnancy the intake of cod liver oil more than four times a week increased significantly from 42% to 66% in the intervention group compared to the control group (Table 2). The women also ate both oily fish and lean fish more often during pregnancy in the intervention group compared to the control group, and there were no time trends regarding diet during pregnancy either in the intervention group or in the control group (Table 2).

Among the children we found a very high and equal proportion of approximately 60% having cod liver oil supplement at 6 weeks postnatal in both cohorts (Table 2). During the first 2 years of life the proportion of infants continuing the cod liver oil supplement was about 10 percentage points higher in the intervention cohort (Tables 3-4). The proportion having oily fish at least once a week was about 14 percentage points higher at 1 year and 2 years of age in the intervention group compared to the control group (Tables 3-4), and there was a positive time trend for eating oily fish in both cohorts at 1 and 2 years of age. There was a statistically significant higher intake of lean fish in the intervention cohort at 1 year postnatal, changing to a significantly higher intake in the control cohort at 2 years of age with no time trend in either cohort. The overall fish intake at one year of age was higher in the intervention cohort, but at 2 years of age the difference was no longer statistically significant (Tables 3-4).

Smoking intervention

A significant and stable decline in maternal and paternal smoking frequencies was reported from start of pregnancy, through 6 weeks postpartum, and at 1 and 2 years postnatal (tables 2-4). The smoking frequency was almost halved at all four assessment points of time in the intervention cohort compared to the control cohort with a minimum for maternal smoking of 5,3% at 6 weeks postnatal and a minimum of 11,5% for paternal smoking at 2 years postnatal. There was a continuous annual trend for reduced parental smoking in the control cohort, but no further annual trend in reduced postnatal parental smoking in the intervention cohort at 1 and 2 years after birth (tables 2-4).

Housing dampness intervention

Indoor dampness index ≥3 was reported by approximately 4% of the participants and constant over and within both cohorts at 6 weeks, 1 and 2 years of age (tables 2-4).

Change in non-intervened risk factors

While there was a reported frequency of some 8%-10% keeping a dog, stable between the cohorts and over time, the frequency of keeping a cat was some 2 percentage points higher in the intervention cohort at six weeks, at 1 and 2 years (Tables 2-4).

The proportion of children who ate vegetables almost daily was inconstantly different between the cohorts. At 1 year, relatively fewer children had vegetables almost daily in the intervention cohort, while at 2 years there was no difference (Tables 3-4). The frequency of breastfeeding at 6 weeks did not differ between cohorts, while the proportion of mothers that reported at 1 year to have breastfed exclusively for more than 4 months was significantly higher in the intervention cohort (Tables 2 - 3).

The non-participants-study

The comparison of participants in the PACT-study (n= 172) with non-participants (n=219), demonstrated only minor and insignificant differences regarding mean age and education. There was a tendency towards reporting more allergic disease and less smoking at start of pregnancy among participants in PACT, but this difference was not statistically significant (Table 5).

Discussion

Pregnancy and the first years of life is a period of frequent contact with health professionals and a favorable period for implementing relevant life-style interventions. The PACT study was conducted over an 8 years period with a historical control cohort established over a 2 years period immediately before the intervention started. The results showed that the dietary intake of lean and oily fish and cod liver oil was statistically significant higher in the intervention cohort, both for mothers during pregnancy and for children during the first 2 years of life. Parental smoking prevalence was generally low postnatal, particularly among the mothers, with a statistically significant difference between the cohorts. There was, however, a

statistically significant annual trend in the control cohort. There was no difference between the cohorts regarding an indoor dampness index ≥ 3.

The comparisons at different age levels permit presentation of behavioral trends. A behavioral trend in the control cohort or in both cohorts simultaneously implies that a possible difference between the cohorts must be interpreted with caution and that other explanations than the intervention program should be considered.

Parents in the intervention group seemed to be more persistent in continuing cod liver oil supplement for their infants. There was an annual trend towards increased oily fish intake among children in both cohorts during first 2 years of life probably reflecting a gradual introduction of fish in the diet for all children. There was, however, a persistent and significant difference in oily fish intake between the cohorts at both 1 and 2 years and a shift towards an increased share of lean fish in the diet in the control cohort during the period. A probable interpretation of this may be that oily fish was substituted for lean fish in the children's diet in the intervention group, which was in accordance with the intervention program.

The low smoking prevalence and annual trend towards less smoking in both cohorts during pregnancy are in accordance with earlier findings showing significantly increasing difference in smoking cessation between pregnant women in Trondheim and the comparable city of Bergen and all of Norway in the actual time period [12]. The PACT study period coincided with new legislation on smoking in public places and ongoing national campaigns against smoking. The increased smoking cessation rate observed among pregnant women in Trondheim compared to Bergen and Norway could possibly be a consequence of the ongoing PACT-project as such, with the increased focus on life-style factors during pregnancy and infancy in general and smoking cessation in particular. Interestingly, the continuous smoking

intervention did not seem to have any additional effect on the few remaining smokers in the intervention group.

We observed no difference in the housing dampness index between the cohorts. This may reflect a low adherence to the housing dampness intervention. Indoor climate was an unknown and unaccustomed subject for intervention among both health professionals and recipients. Even more expensive and extensive actions as improved roofing and drainage of buildings could have been recommended, but the program had no resources to follow up on this level. The stable fraction of approximately 4% reporting indoor dampness index ≥ 3 within and between both cohorts at all ages indicates that the question on this topic was highly reliable.

The strengths of the study are the controlled cohort design with a large number of pregnant women followed prospectively in the intervention cohort, and the assessment of risk-factor behavior that was consistent through the observation period and across cohorts. The non-randomized design was adapted to comply with the assignment to investigate the effectiveness of interventions implemented in the way new guidelines usually are in ordinary primary health care[27]. We decided on a design with a control cohort 1 year in advance of the intervention primarily because a public and community based intervention including the entire primary health care in the municipality would have been impossible to implement without contaminating a co-existing control cohort. Secondly, this design also ensured high conformity between the cohorts regarding population size, race/ethnicity, maternal educational level, income, environment, urbanization and social characteristics [28]. This was supported by the results from the additional non-participants-study that included 391 subjects, indicating no major selection bias. Only self reported questionnaires were used, as this is a common and feasible way of assessing information in large epidemiologic studies[21,29]. For

smoking behavior self reported questionnaires are known to have equal or better reliability, compared to interviews using a structured questionnaire [30,31].

A potential weakness may be that the cohort design with a 1 year difference between the control cohort and intervention cohort might have biased the results toward a better effectiveness of the intervention as a consequence of possible annual trends. Although the intervention program was adopted as the official prophylactic program in the community, and nearly 100% of pregnant women visit their GP regularly, only some 34% of the eligible pregnant women participated in the PACT study. The moderate participation rate was a consequence of the long duration of the study resulting in a decreasing awareness of the study[32] causing low participation among many GPs and midwifes in the community, and not as a result of self selection among participants. Importantly, we had almost no withdrawals in either cohort. Moreover, we deliberately did not monitor how far the health care providers implemented the interventions or followed the guidelines. Such a registration procedure could in effect be an intervention to improve the interventional efforts among the health professionals, thereby not complying with the need that the intervention program should be transferable to primary health care in other communities without extra cost or time expenditure. The implementation strategies were considered modest in accordance with the real-life demand, and the effectiveness of the interventional program was exclusively based on parental self-reported risk-factor behavior questionnaires [33,34].

Conclusions

GPs, midwives, health visitor nurses and parents in the community were jointly responsible for developing an intervention program that were implemented as an official community strategy in primary health care without extra cost or time expenditure. The dietary intervention to increase the intake of cod liver oil and oily fish in pregnancy and among mothers and children first 2 years was successful. The observed reduced smoking behavior

could not be attributed to the intervention, and there was no effect of the intervention on indoor dampness. Investigations to develop strategies for successful interventions in primary health care are still needed.

Competing interests

The authors have no competing interests.

Authors' contributions

OS and TØ participated in the design and coordination of the study and drafted the manuscript. JAJ participated in the design of the study and the questionnaires. CKD contributed to analysis and presentation of data and finalization of the manuscript. RJ, the principal investigator of PACT, conceived the study, and participated in its design and coordination and helped draft the manuscript. All authors read and approved the final manuscript.

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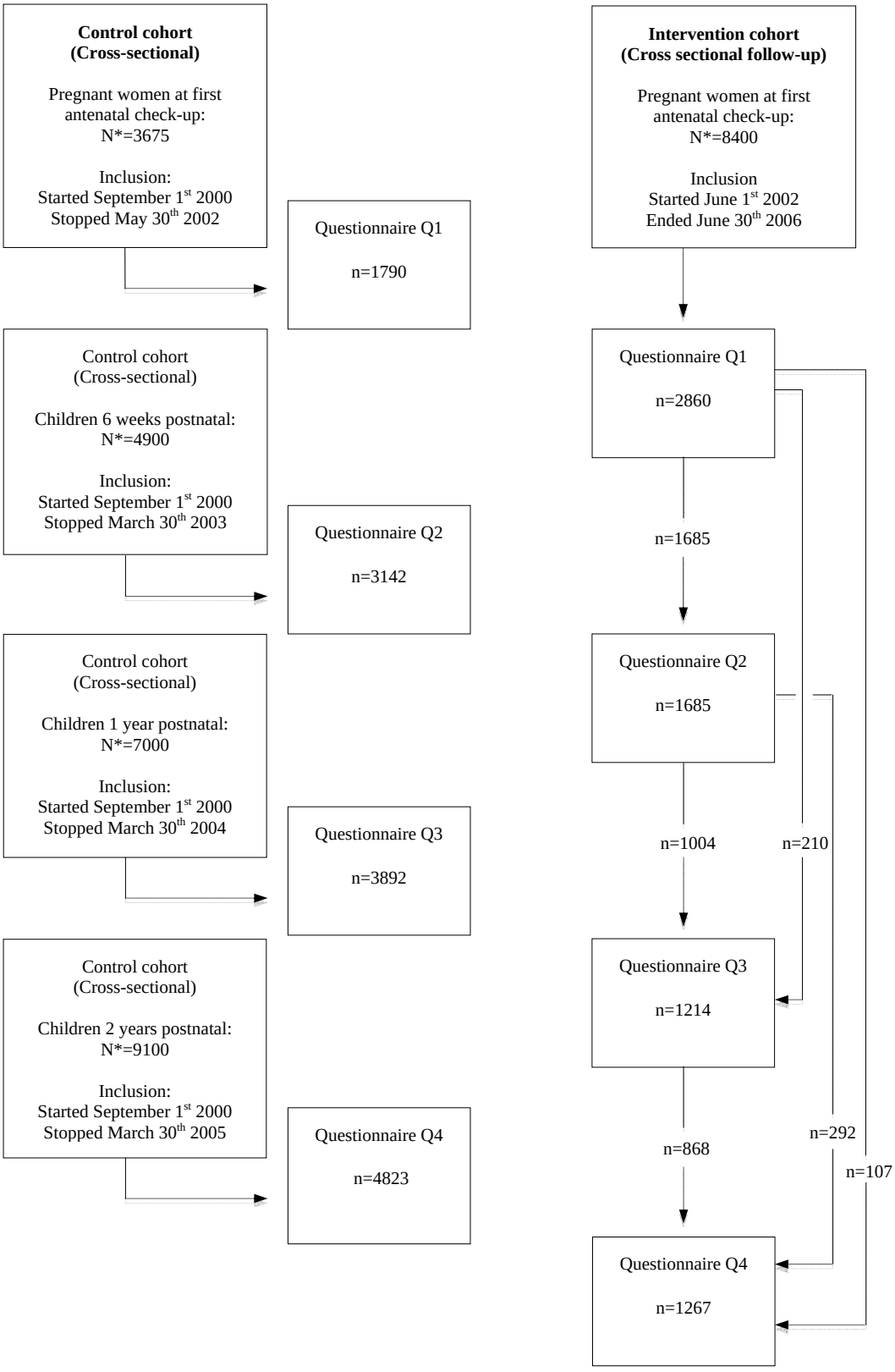
Fig 1. Flow-chart for the PACT-study 2000 - 2009



A total of 7845 participants in the control cohort completed 13647 self-reported questionnaires from 2002-2005.

The intervention cohort was completed in March 2009.

* Total population of children born in Trondheim during inclusion period.

Q1=Questionnaire on behavior and risk factors at first antenatal check-up during pregnancy

Q2=Questionnaire on behavior and risk factors at 6 weeks of age.

Q3=Questionnaire on behavior and risk factors at 1 year of age.

Q4=Questionnaire on behavior and risk factors at 2 years of age

In this paper Q2, Q3 and Q4 in both cohorts have been used.

Table 1. Characteristics of parents and children participating in the intervention cohort and the control cohort

	Cohorts		
	Intervention	Control	
	Mean (SD)		
Age mother (years)	29,5 (4,3)	29,2(4,7)	
Education mother (years)	15,7 (2,5)	15,4 (2,6)	
Education father (years)	15,1 (2,9)	15,0 (3,1)	
Birthweight (grams)	3610 (544)	3590 (573)	
	N (%)		p-value
Gender (male)	48,4	50,1	0,16
Primiparous	44,9	52,2	<0,001
Single mother	1,9	4,3	<0,001
Parental atopy*	68,5	69,4	0,56
Homeowner**	84,1	78,5	<0,001

*Mother and /or father ever had asthma, allergic rhinoconjunctivitis or eczema.

** At 6 weeks postnatal

Table 2. Different exposure and risk behaviours assessed at 6 weeks after birth and the change in annual prevalence for the intervention cohort and for the control cohort (PACT 2009).

	Intervention Cohort (n = 1685)				Control Cohort (n = 3142)					
	Rate	%	95% CI	P trend*	Rate	%	95% CI	P trend*	OR*	95% CI
At start pregnancy										
Maternal smoking	283/1636	17.3	15.5-19.2	0.001	702/2969	23.6	22.2-25.2	0.01	0.70	0.60-0.82
Paternal smoking	292/1594	18.3	16.5-20.3	0.001	652/2803	23.3	21.7-24.9	0.03	0.80	0.68-0.94
During pregnancy										
Maternal cod liver oil intake 4 times a week or more	1098/1660	66.1	63.8-68.4	0.59	1288/3055	42.2	40.4-43.9	0.16	2.44	2.15-2.78
Maternal oily fish intake once a week or more	624/1553	40.2	37.8-42.6	0.61	858/2812	30.5	28.8-32.2	0.36	1.51	1.32-1.72
Maternal lean fish intake once a week or more	658/1666	39.5	37.2-41.9	0.61	807/3055	26.4	24.9-28.0	0.40	1.80	1.58-2.06
Maternal vegetable almost daily	876/1476	59.3	56.8-61.9	0.25	1548/2704	57.2	55.4-59.1	0.15	1.06	0.93-1.21
At 6 weeks after birth										
Maternal smoking	87/1634	5.3	4.3-6.5	0.002	317/2934	10.8	9.7-12.0	<0.001	0.55	0.42-0.70
Paternal smoking	200/1587	12.6	11.1-14.3	0.04	593/2768	21.4	19.9-23.0	0.01	0.59	0.49-0.70
Keeping dog in house	142/1566	9.1	7.7-10.6	0.69	289/2826	10.2	9.16-11.4	0.95	0.83	0.67-1.03
Keeping cat in house	174/1566	11.1	9.7-12.8	0.58	251/2826	8.9	7.9-10.0	0.90	1.32	1.07-1.64
Indoor dampness Index ≥ 3	69/1672	4.1	3.3-5.2	0.66	129/3062	4.2	3.6-5.0	0.88	1.08	0.79-1.46
Breastfeeding	1644/1665	98.7	98.1-99.2	0.39	3061/3110	98.4	97.9-98.8	0.81	1.00	0.59-1.71
Child having cod liver oil supplement	1011/1665	60.7	58.4-63.0	0.57	1786/3102	57.6	55.8-59.3	0.66	1.03	0.93-1.21

Comparisons of risk behaviour between the intervention cohort and the control cohort are presented as OR with 95% CI (Based on logistic regression).

Change in annual prevalence (intervention cohort 2004-2007, control cohort 2000-2003) presented as p- value for trend.

*Adjusted for maternal age, parity, parental atopy and homeowner.

Table 3. Different exposure and risk behaviours at 1 year after birth and the change in annual prevalence for the intervention cohort and for the control cohort (PACT 2009).

	Intervention Cohort (n = 1214)				Control Cohort (n = 3892)					
	Rate	%	95% CI	P trend*	Rate	%	95% CI	P trend*	OR*	95% CI
At 1 year after birth										
Maternal smoking	105/1198	8.8	7.3-10.5	0.17	720/3755	19.2	18.0-20.5	<0.001	0.47	0.38-0.59
Paternal smoking	148/1144	12.9	11.1-15.0	0.15	724/3468	20.9	19.6-22.3	<0.001	0.64	0.52-0.77
Keeping dog in house	95/1139	8.3	6.9-10.1	0.11	318/3560	8.9	8.0-9.9	0.74	0.90	0.71-1.16
Keeping cat in house	122/1139	10.7	9.0-12.7	0.87	312/3560	8.8	7.9-9.7	0.46	1.33	1.06-1.67
Indoor dampness index	47/1205	3.9	2.9-5.2	0.44	158/3800	4.2	3.6-4.8	0.27	1.00	0.72-1.41
Children's diet at 1 year of age										
Exclusively breastfed 4 months or more	957/1206	79.4	77.0-81.5	0.008	274/3856	71.1	69.6-72.5	0.14	1.46	1.25-1.72
Cod liver oil 4 times a week or more	568/1209	47.0	44.2-49.8	0.34	1497/3858	38.8	37.3-40.4	0.77	1.27	1.11-1.46
Any kind of fish once a week or more	712/1213	58.7	55.9-61.4	0.03	1879/3872	48.5	47.0-50.1	0.06	1.53	1.33-1.74
Oily fish once a week or more	445/1213	36.7	34.0-39.4	0.02	908/3878	23.4	22.1-24.8	<0.001	1.88	1.63-2.17
Lean fish once a week or more	582/1204	48.3	45.5-51.2	0.29	1679/3855	43.6	42.0-45.1	0.46	1.24	1.08-1.42
Vegetables almost daily	889/1198	74.2	71.7-76.6	0.76	2910/3814	76.3	75.0-77.7	0.79	0.87	0.74-1.01

Comparisons of risk behaviour between the control cohort and the intervention cohort are presented as OR with 95% CI (Based on logistic regression).

Change in annual prevalence (intervention cohort 2005-2008, control cohort 2000-2004) presented as p- value for trend.

*Adjusted for maternal age, parity, parental atopy, homeowner.

Table 4. Different exposure and risk behaviours at 2 years after birth and the change in annual prevalence for the intervention cohort and for the control cohort (PACT 2009).

	Intervention Cohort (n = 1267)				Control Cohort (n = 4826)					
	Rate	%	95% CI	P trend*	Rate	%	95% CI	P trend*	OR*	95% CI
At 2 years after birth										
Maternal smoking	123/1244	9.9	8.4-11.7	0.87	885/4661	19.0	17.9-20.1	<0.001	0.50	0.41-0.61
Paternal smoking	136/1183	11.5	9.8-13.4	0.11	760/4217	18.0	16.9-19.2	<0.001	0.62	0.51-0.75
Keeping dog in house	96/1198	8.0	6.6-9.7	0.53	368/4403	8.4	7.6-9.2	0.23	0.95	0.75-1.21
Keeping cat in house	133/1198	11.1	9.4-13.0	0.41	398/4403	9.0	8.2-9.9	0.71	1.31	1.06-1.62
Indoor dampness index	46/1259	3.7	2.7-4.9	0.10	170/4740	3.6	3.1-4.2	0.11	1.03	0.74-1.45
Children's diet at 2 years of age										
Cod liver oil 4 times a week or more	539/1257	42.9	40.2-45.6	0.43	1609/4767	33.8	32.4-35.1	0.80	1.44	1.27-1.64
Any kind of fish once a week or more	926/1258	73.6	71.1-76.0	0.87	3398/4782	71.1	69.8-72.3	0.96	1.13	0.98-1.30
Oily fish once a week or more	625/1264	49.4	46.7-52.2	0.04	1679/4809	34.9	33.6-36.3	<0.001	1.85	1.63-2.10
Lean fish once a week or more	768/1256	61.1	58.4-63.8	0.61	3086/4776	64.6	63.3-66.0	0.07	0.85	0.75-0.97
Vegetables almost daily	630/1252	50.3	47.6-53.1	0.25	2340/4735	49.4	48.0-50.8	<0.001	1.01	0.89-1.15

Comparisons of risk behaviour between the control cohort and the intervention cohort are presented as OR with 95% CI (Based on logistic regression).

Change in annual prevalence (intervention cohort 2006-2009, control cohort 2000-2005) presented as p- value for trend.

*Adjusted for maternal age, parity, parental atopy, homeowner.

Paper 2

BMC Public Health

Research article

The impact of a minimal smoking cessation intervention for pregnant women and their partners on perinatal smoking behaviour in primary health care: A real-life controlled study

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Abstract

Background: There is a demand for strategies to promote smoking cessation in high-risk populations like smoking pregnant women and their partners. The objectives of this study were to investigate parental smoking behaviour during pregnancy after introduction of a prenatal, structured, multi-disciplinary smoking cessation programme in primary care, and to compare smoking behaviour among pregnant women in the city of Trondheim with Bergen and Norway.

Methods: Sequential birth cohorts were established to evaluate the intervention programme from September 2000 to December 2004 in primary care as a part of the Prevention of Allergy among Children in Trondheim study (PACT). The primary outcome variables were self reported smoking behaviour at inclusion and six weeks postnatal. Data from the Medical Birth Registry of Norway (MBR) were used to describe smoking cessation during pregnancy in Trondheim, Bergen and Norway 1999–2004.

Results: Maternal smoking prevalence at inclusion during pregnancy were 5% (CI 95% 4–6) in the intervention cohort compared to 7% (CI 95% 6–9), p = 0.03, in the control cohort. Of the pre-pregnancy maternal smokers 25% (CI 95% 20–31) and 32% (CI 95% 26–38), p = 0.17, were still smoking at inclusion in the intervention and control cohorts, respectively. Six weeks postnatal 72% (CI 95% 59–83) and 68% (CI 95% 57–77), p = 0.34 of the maternal smokers at inclusion still smoked. No significant difference in paternal smoking between the cohorts was found after the intervention period. Data from the MBR showed a significantly higher proportion of women who stopped smoking during pregnancy in Trondheim than in Bergen in 2003 and 2004, p = 0.03 and < 0.001, respectively.

Conclusion: No impact on parental smoking behaviour between the cohorts was observed after the smoking intervention programme. Of the women who stopped smoking during pregnancy most of them stopped smoking before the intervention. However, we observed a significantly higher quitting rate in Trondheim than in Bergen in 2003 and 2004 which may have been facilitated by the supplemental attention on smoking behaviour the PACT study initiated.

Background

Smoking in pregnancy is a well documented and potentially avoidable risk factor for a multitude of conditions, including miscarriage, low birth weight, perinatal death, childhood asthma and atopic disease [1-3]. Despite evidence-based knowledge of the harmful effects, tobacco smoking is still prevalent during pregnancy.

Prevalence studies in the 1980s showed that one in three pregnant women in Norway smoked during pregnancy, at that time among the highest smoking prevalence in Europe [4-6]. Eriksson et al. showed that the point prevalence of smoking at 18 weeks of gestation in Trondheim was 34% in 1987 compared to 22% in 1994, a statistically significant reduction. No effect of the national campaign against smoking during pregnancy launched in 1989 was found [7]. Public health interventions and smoking bans have since then shown success in some Western countries [8]. Norway has a history of more than 40 years of regulation of tobacco advertising and tobacco smoking in public. The 1975 Tobacco Act involved an advertising ban, 16 years age limit for buying tobacco products and labelling of tobacco products. Restrictions on smoking in public restaurants, bars, cafes, pubs and discotheques came in 1993, but a total ban on smoking in restaurants and bars first took effect on June 1st 2004. The first national comprehensive mass media campaign on tobacco and health for many years was accomplished during the study period in 2003.

A review article from 2000 stated that pregnancy and the postpartum period provide a window of opportunity to promote smoking cessation[9]. A Cochrane review from 2004 concluded that smoking cessation programmes in pregnancy reduce the proportion of women who continue to smoke [10]. Further, a meta analysis from 2000 found that a brief cessation counselling session of 5–15 minutes, when delivered by a trained provider with the provision of pregnancy specific self help materials, significantly increased rates of cessation among pregnant smokers, and these evidence based procedures were recommended to be adopted by all prenatal health care providers [11].

In 1997 the Norwegian Government appointed Trondheim as a model city to try out a new public intervention to counteract the rising incidence of asthma and allergic diseases. It was a prerequisite that the intervention programme should be possible to implement in ordinary pre- and postnatal care, without extra cost, and within normal consultation timeframe. The PACT-study was initiated in collaboration between the Norwegian University of Science and Technology (NTNU) and the municipality of Trondheim. The PACT study is a still ongoing, controlled, prospective, intervention study that was started in 2000 [12]. The primary objectives of the PACT study were to investigate the effectiveness of the risk-factor intervention on behavioural changes among parents, secondly to investigate the efficacy on the incidence of allergic diseases in the offspring from increasing omega-3- fatty acid intake and reducing parental smoking and indoor dampness [13].

The objectives of this study were to investigate parental smoking behaviour during pregnancy after introduction of a prenatal, structured, multi-disciplinary smoking cessation programme in primary care, and to compare smoking behaviour among pregnant women in the city of Trondheim with Bergen and Norway.

Methods

The study was performed in the city of Trondheim, the capitol city in middle Norway with 160 000 inhabitants and approximately 2100 deliveries per year. The city holds a University with 20 000 students and 4500 employees. In all, 28 of 35 general practices (90 general practitioners), all eight community based midwifes and all 20 maternity health centres in Trondheim agreed to participate in the PACT study.

Cohorts and subjects

Sequential birth cohorts were established to evaluate the intervention programme. From September 1st 2000 to May 30th 2002 all pregnant women who consulted their GPs or community based midwifes for pregnancy care were eligible to participate in the control cohort of the PACT study. Of some 3600 eligible pregnant women in Trondheim during this period, 1788 (50%) women were included and completed the pregnancy questionnaire (Q1), and 1023 (57%) of the participating women completed the questionnaire (Q2) six weeks after delivery (Figure 1). Participating women in the control cohort received common, nationwide recommended, advice on life-style, including smoking behaviour, following the routines each health-worker was familiar with at that time.

From June 1st 2002 to December 15th 2004 women were invited and included to the intervention cohort of the study. Of some 5200 pregnant women eligible to participate in the intervention cohort during this period, 2051 (40%) women gave their consent and answered the pregnancy questionnaire, and 1109 (54%) of the participating women completed the questionnaire six weeks after delivery.

All pregnant women were eligible to the PACT study if they were able to understand and fill in a questionnaire in Norwegian language with no other inclusion or exclusion criteria for either cohort.

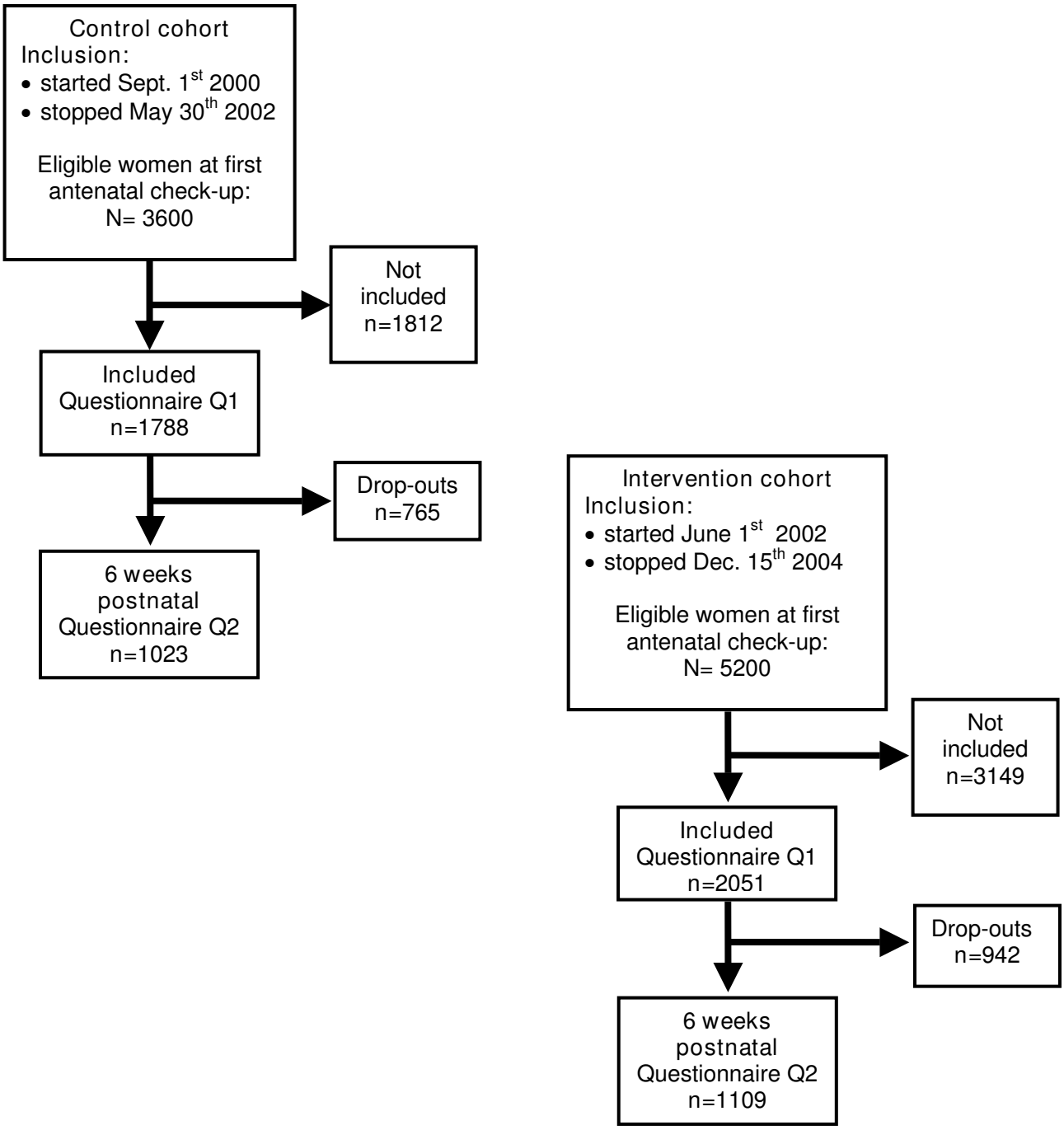

Figure 1
Flow chart. The same questionnaires were used in both cohorts. Q1 = questionnaire during pregnancy, measurement of smoking behaviour at start pregnancy and at inclusion at first antenatal check-up. Q2 = questionnaire at six weeks postnatal, measurement of present smoking behaviour.

Intervention programme

The intervention programme on diet, indoor dampness, and smoking cessation was developed in collaboration with midwives, maternity care nurses, GPs, and parents as a multiple health behaviour intervention. The smoking intervention programme was a brief office intervention

[14]. The intervention was adapted from the United States Department of Health and Human Services Public Health Service (USHPS) guideline "*Treating Tobacco Use and Dependence. Clinical Practice Guideline*"[15]. From June 2002 the intervention was adopted by the city health authorities to be implemented by all health professionals as an integrated part of the recommended maternity care life-style counselling programme in primary health care throughout Trondheim, regardless of participation in the PACT study or not. The intervention programme continued throughout pregnancy at GP and midwife consultations. The recommended primary care prenatal schedule for follow-up in Norway was the same for both cohorts and constitutes of 8–10 prenatal consultations with a GP or midwife from week 8–10 in pregnancy. This programme has been accessible to all women in Norway for many years, free of charge, and with an attendance rate of nearly 100%. The women were invited to bring their partners to the consultations, and if he was a smoker they were encouraged to make a smoking cessation effort together.

Midwifes, public health nurses and GPs were offered a three hours course to improve smoking cessation counselling skills, to obtain a consistent intervention and inspire enthusiasm [16]. All midwifes and 22 of the 28 participating group practices attended the course. In addition, all participating midwifes and GPs were supplied with written strategy guidelines describing the intervention in detail. Some 7% of the participating women in the intervention cohort were included by GPs that did not attend the three hours course. All women included in the intervention cohort were regarded as intervened upon whether their GP had delivered the intervention or not. Self-help materials to be offered to the participants were also distributed to all primary care health professionals. Continuous smoking cessation groups were allocated to the maternity care centres and administered by public health nurses. The health professionals received four follow-up newsletters during the intervention.

Outcome variables

PACT data

The primary outcome variable was self-reported parental smoking behaviour at six weeks postnatal. The participants were asked to complete a self-reported life-style questionnaire including smoking behaviour at the first maternity clinic check-up (gestational week 8–12) and later at six weeks after delivery. Parental smoking during pregnancy was assessed with two questions at the antenatal questionnaire. The women were asked if they or their partner were smoking at the beginning of pregnancy, if they were smoking now and daily and/or weekly cigarette consumption. A separate question was asked about the total numbers of cigarettes smoked indoors. The same questions were asked six weeks postnatal. Smoking was coded as a dichotomous variable, if they were smoking more than one cigarette a week they were coded as smokers, if the answer was "no" they were coded as non-smokers, and if the answers to all questions on smoking were missing they were coded as missing. No biomarker such as hair nicotine was measured.

National data

Aggregated data from the Medical Birth Registry of Norway (MBR) were used to illustrate smoking cessation in Norway and the two comparable cities of Bergen and Trondheim from 1999 to 2004.

Bergen is the second largest city in Norway, with 245 000 inhabitants and around 3200 deliveries per year, with a University with some 16 000 students. Smoking data from the MBR were available from 1999–2004. These data are collected as a mandatory procedure at discharge from any maternity ward in Norway. Forms are completed by a midwife or physician interview and by using the hospital medical records. The women are asked if they smoked at the beginning or end of pregnancy, and they can answer "no", "occasionally" and "yes". Smoking was coded as a dichotomous variable, "occasionally" and "yes" were coded as smokers,"no" as non-smokers. Data were available for approximately 90% of the women who gave birth during the period from 1999 to 2004 according to information from the MBR.

The non-responder study

To investigate if there was a selection bias among participants in the PACT study we conducted an non-responder study where 391 parents who consecutively visited maternal postnatal care were asked to complete a short and anonymous questionnaire on age, socioeconomics, allergic disease and smoking behaviour, regardless of participation in the PACT-study or not.

Educational data

Maternal and paternal education was not accounted for in the original questionnaire. Thus, some 800 randomly selected parents answered questions on education (797 women and 812 men), either written or by telephone interview.

Approvals

The Regional Committee for Medical Research Ethics for Central Norway approved the study (Ref 120–2000). The study was granted license by the Norwegian Data Inspectorate to process personal health data and one of the parents signed a written informed consent formula (Ref 2003/953-3 KBE/-).

Statistics

SPSS for Windows® ver.14.0 (Chicago, Ill. USA) was used for all statistical analyses. Comparisons between groups were tested by chi square tests for categorical data and independent t-tests for continuous data. Confidence intervals (95% CI) were estimated for prevalence and odds ratio using binomial distribution for dichotomous data, and normal distribution for continuous data. Confounding factors were identified by *a priori* knowledge, and maternal age at the beginning of pregnancy, parity; marital status, homeowner (as a proxy for social status) and paternal smoking at the beginning of pregnancy were tested in several models. The resulting set of covariates included maternal age at the beginning of pregnancy, parity and marital status. We used GLM with binomial regression in a predictive model (STATA ver. 10.0) to adjust smoking prevalence at the beginning of pregnancy, at inclusion and at 6 weeks post partum in both cohorts. Parental smoking was stratified into smokers and non-smokers at the beginning of pregnancy and at time of inclusion, and binary logistic regression models were used to estimate adjusted odds ratio (aOR) for smoking at inclusion and at six weeks postnatal, respectively, in the intervention cohort compared to the control cohort. Finally, binary logistic regression models were used to estimate aORs for the associations between smoking cessation before inclusion (spontaneous quitting) and background factors The results are analysed and presented according to the STROBE recommendations [17].

Results

Some 28 of 35 general practices in Trondheim included a total of 2657 women into both cohorts by end 2004, ranging from 14 to 348 per practice, with 69% of the practices including more than 40 participants. The community midwives included altogether 1181 women. This gave a participation rate of about 44% of the eligible pregnant women in Trondheim. The non-responder study on 391 parents showed no selection bias for participants in the PACT-study regarding age, socioeconomics, allergic disease, or smoking behaviour (table 1).

Background characteristics of the intervention and control cohorts

There were significantly more primiparous women, fewer single mothers, more educated women and more dropouts in the intervention cohort. The cohorts did not differ regarding maternal age, paternal education; the number of cigarettes smoked a day by mother or father, neither at the beginning of pregnancy nor at inclusion. The characteristics of the cohorts are presented in table 2.

Comparing dropouts from the intervention and control cohorts neither their mean age, 28.7 years (SD 4.8) and 28.5 years (SD 4.8) p = 0.56, nor being a homeowner, OR 1.1 (CI 95% 0.9–1.3) p = 0.43, nor the proportion who smoked more than 10 cigarettes a day, OR 1.1(CI 95% 0.7–1.6) did differ. There were, however, significantly more single women among dropouts in the intervention cohort, OR 1.3 (CI 95% 1.1–1.6) p = 0.004 (table 3). Among the women who smoked at inclusion, 140 and 184 women in the intervention cohort and control cohort, respectively, there was no significant difference in dropouts as 80 smokers dropped out from the intervention cohort and 90 smokers from the control cohort, (p = 0.15). Information on smoking among dropouts was missing for 7% and 5% in the intervention and control cohort, respectively.

Smoking prevalence

The maternal smoking prevalence in the intervention cohort was significantly lower at the beginning of pregnancy and at inclusion, but not at six weeks post partum. Paternal smoking prevalence did not differ between the cohorts at the beginning of pregnancy, but was significantly lower in the intervention cohort at inclusion and six weeks post partum (table 4).

Table 1: The non-responder study (N = 391). Characteristics of responders and non-responders to the PACT study

	Non-responders (n = 219)			Responders (n = 172)			
	n	%	CI 95%	n	%	CI 95%	p-value
Atopy in the family*	120	55.0	48.4–61.6	109	63.4	56.2–70.6	0.1
Mothers smoking at the beginning of pregnancy	46	21.0	15.6–26.4	28	16.3	10.8–21.8	0.25
Mothers smoking now	23	10.6	6.5–14.7	16	9.3	5.0–13.6	0.74
Fathers smoking at the beginning of pregnancy	39	18.6	13.5–23.8	32	18.9	13.1–24.8	1
Fathers smoking now	37	17.5	12.5–22.5	23	13.5	8.4–18.6	0.32
	Median	Mean	SD	Median	Mean	SD	p-value
Maternal age	30	30.8	5.1	30.5	30.7	4.8	0.89
Maternal education (years)	15	15.1	2.1	16	15.6	2.5	0.08
Fathers education (years)	15	15.1	3.1	16	15.3	2.9	0.64

*Atopy = mother or father or sibling reporting at least one atopic disease

Table 2: Characteristics of the intervention cohort (N = 2051) and the control cohort (N = 1788) at inclusion n = number of participants included in analysis

		Intervention cohort			Control cohort			
		n	%	95% CI	n	%	95% CI	p-value
Single mother*		1072	1.9	1.1–2.7	994	3.8	2.6–5.0	0.01
Primiparous		2051	56.6	54.5–58.7	1785	48.6	46.3–50.9	<0.001
		n	mean	SD	n	mean	SD	
Maternal age (years)		2044	28.6	4.6	1766	28.8	4.7	0.14
Maternal education (years)†		283	16.1	2.2	514	15.8	2.3	0.05
Paternal education†		289	15.4	2.7	523	15.2	2.9	0.34
No. of cig. a day among smokers at the beginning of pregnancy	Mother	462	8.6	7.9	475	8.0	6.1	0.19
	Father	438	9.8	8.3	413	9.6	6.7	0.68
No. of cig. a day among smokers at inclusion	Mother	140	5.3	7.4	184	4.9	4.0	0.57
	Father	355	8.8	8.6	356	8.2	6.4	0.27

*Data from questionnaire 6 weeks postnatal
† Data available for 797 women and 812 men

Smoking behaviour during pregnancy

Data stratified according to smoking behaviour at the beginning of pregnancy demonstrated that in the intervention cohort only one in four of the smoking women continued to smoke from the beginning of pregnancy until inclusion, with no significant difference between the cohorts. In contrast, most men continued to smoke in the same period, but significantly fewer in the intervention cohort. Very few men and women started smoking from the beginning of pregnancy until inclusion (table 5). In one model participants with missing smoking data were recoded as smokers. Neither in this model did we find any significant difference between the cohorts regarding smoking behaviour 6 weeks postnatal for women smoking at inclusion, aOR = 0.72 (95% CI 0.42–1.22, p = 0.22)

When we stratified according to smoking behaviour at inclusion we found that most women who smoked at inclusion continued smoking during pregnancy, about 7 in 10 women smoked at six weeks postnatal, with no significant difference between the cohorts. We found the same result among their partners. Some two percent of those who were non-smokers at inclusion were smoking at six weeks postnatal with no significant difference between the cohorts (table 6).

When we looked at both cohorts combined women who were at risk for continued smoking after the beginning of pregnancy and still smoking at inclusion were living single, multiparous women and women who smoked more than 10 cigarettes a day. At the beginning of pregnancy 518 (25%) of the women were smoking more than one cigarette weekly, 25 women had missing data, and 493 women were included in the analysis (table 7). At high risk for continued smoking at inclusion were multiparous women smoking > = 10 cigarettes a day compared to all other smoking women at the beginning of pregnancy, OR 3.5, p < 0.001.

Indoor smoking

At inclusion 18% of the parental smokers in the intervention cohort, and 28% in the control cohort reported indoor smoking (p = 0.01). At six weeks post partum only one parent in the intervention cohort and nine parents (5%) of the parental smokers reported indoor smoking (p = 0.04). When all with missing data on indoor smoking were recoded as indoor smokers 5% and 8% were indoor smokers in the intervention cohort, and control cohort, respectively.

Smoking cessation in Trondheim, Bergen and Norway

Data from MBR showed a quitting rate of about 30–40% from 1999 to 2002 with no difference between Trondheim, Bergen and Norway. In 2003 and 2004 the proportion of women who stopped smoking during pregnancy in Trondheim increased seemingly more than in Bergen

Table 3: Maternal smoking prevalence among drop-outs

	Intervention cohort			Control cohort			
	n	%	95% CI	n	%	95% CI	p-value
Drop-outs*	942	45.9	42.7–49.8	765	42.8	39.3–46.3	0.05
Maternal smoking prevalence at the beginning of pregnancy	877	25.1	22.2–28.0	729	27.3	24.1–30.5	0.33
Maternal smoking prevalence during pregnancy	877	9.1	7.2–11.0	723	12.4	10.0–14.8	0.03

*Drop-outs = answered questionnaire in pregnancy but not answered questionnaire six weeks postnatal

Table 4: Adjusted* parental smoking prevalence in the intervention cohort and the control cohort

	Intervention cohort		Control cohort				
Maternal smoking prevalence	%	95% CI	%	95% CI	aOR	95% CI	p-value
At the beginning of pregnancy	21.7	19.4–24.1	25.1	22.7–27.6	0.78	0.61–1.00	0.05
At inclusion	4.9	3.5–6.4	7.1	5.6–8.6	0.63	0.42–0.95	0.03
6 weeks postnatal	5.8	4.3–7.4	7.6	6.0–9.2	0.72	0.49–1.06	0.09
Paternal smoking prevalence							
At the beginning of pregnancy	21.9	19.2–24.6	24.7	21.8–27.5	0.86	0.69–1.07	0.17
At inclusion	17.0	14.5–19.5	21.2	18.5–23.9	0.76	0.60–0.97	0.03
6 weeks postnatal	14.5	12.2–16.9	17.9	15.4–20.4	0.78	0.60–1.00	0.05

*Parental smoking prevalence adjusted for maternal age at start pregnancy, first child and marital state.

and Norway (figure 2). In Trondheim 64% of the pre-pregnancy smoking women stopped smoking at the beginning of pregnancy or during pregnancy in 2004.

Discussion

We found a low smoking prevalence at inclusion, 4.9% and 7.1% in the intervention cohort and the control cohort, respectively. Only a quarter of the pre-pregnancy smoking women still smoked at inclusion time with no difference between the cohorts. During the intervention period from inclusion until six weeks postnatal, 7 in 10 smokers still smoked six weeks postnatal with no significant difference between the cohorts. At inclusion 18% and 28% reported indoor smoking in the intervention cohort and the control cohort, respectively. At six weeks postnatal very few of the smokers reported indoor smoking, only one parent in the intervention cohort, and nine parents in the control cohort.

Data from MBR illustrating quitting rates in Trondheim, Bergen and Norway showed a seemingly higher proportion of women who stopped smoking at the beginning or during pregnancy in Trondheim than in Bergen in 2003 and 2004.

The study had a controlled design comparing sequential total and unselected cohorts of pregnant women from the beginning of pregnancy until six weeks postnatal. Choosing a controlled design including whole birth cohorts made it possible in a real life approach to test the intervention programme. The assessment of smoking behaviour was consistent through the observation period and across cohorts, and independent of clinical practice. Furthermore, the majority of care providers were trained and motivated to deliver the recommended intervention modalities on repeated occasions both to those who smoked and those who had quit smoking [18]. Finally, when health professionals take part in a scheduled and structured intervention, it may counteract any potential negative beliefs and attitudes against promoting smoking cessation [19]. The possibility to compare smoking cessation nationally and in the two comparable university cities of Trondheim and Bergen in the same period that the sequential cohorts in PACT were investigated was an additional strength of the study.

The one year time difference between the control cohort and intervention cohort might have biased the results towards a better effect of the intervention due to secular trends. However, this was the design of choice primarily because a public and community based intervention including the entire primary health care in the municipality would be impossible to implement without contaminating a co-existing control cohort. Secondly, comparing total birth cohorts also ensured high conformity between the cohorts regarding population size, race/ethnicity, maternal educational level, income, environment, urbanization and social characteristics [20]. The use of self reported questionnaires on smoking behaviour were adopted based on documentation indicating equal or bet-

Table 5: Prevalence of parental smokers at inclusion stratified according to smoking behavior at the beginning of pregnancy

Smoking behavior at the beginning of pregnancy	Parental smoking prevalence at inclusion								
	Intervention cohort			Control cohort					
	n	%	95% CI	n	%	95% CI	aOR	95% CI	p-value
Mother non-smoking	1	0.1	0–0.8	1	0.1	0–0.9			
Mother smoking	57	24.7	19.5–30.6	82	31.7	26.3–37.6	0.66*	0.43–1.04	0.17
Father non-smoking	3	0.4	0.1–1.2	3	0.5	0–1.4			
Father smoking	162	75.3	69.2–80.7	176	84.6	79.1–88.9	0.58†	0.35–0.96	0.03

*Adjusted for first child, maternal age and paternal smoking at start pregnancy
†Adjusted for first child and maternal age

Table 6: Comparison of parental smoking between the cohorts after the smoking intervention programme

Smoking behaviour at inclusion:	Parental smoking prevalence 6 weeks post partum Intervention cohort n	%	95% CI	Control cohort n	%	95% CI	aOR	95% CI	p-value
Mother non-smoking	20	2,1	1,3–3,2	27	3,2	2,2–4,6	0,77*	0,42–1,42	0,40
Mother smoking	42	72,4	59,1–83,3	57	67,9	57,3–76,9	1,54*	0,63–3,73	0,34
Father non-smoking	24	2,9	2,0–4,4	21	3,1	2,0–4,7	0,92†	0,53–1,59	0,76
Father smoking	116	69,9	62,5–76,4	134	74,0	67,2–79,9	0,61†	0,35–1,04	0,07

Stratified analysis according to smoking behaviour at inclusion, crude prevalence stated for smoking.
*aORs adjusted for maternal age, first child, and paternal smoking at the beginning of pregnancy
†aORs adjusted for first child and maternal age

ter reliability compared to interviews using a structured questionnaire [21,22]. Furthermore, a Norwegian validation study had already shown that Norwegian pregnant women generally reported their smoking habits correctly [23]. We used no biomarkers for tobacco smoking, as this is unfeasible in large epidemiologic studies, and earlier studies have demonstrated that such biomarkers give little or no additional accuracy to the registration of smoking behaviour when compared to self reported smoking in pregnancy [24,25].

Participation and dropouts

During the study period starting September 1st 2000 and ending December 15th 2004, 3839 of some 8800 eligible pregnant women in Trondheim took part in the PACT study, giving a participation rate of 44%. The participation rate was a consequence of low inclusion activity among many GPs and midwifes, and not a consequence of self selection among women. There is no reason to assume a selection bias, as confirmed by results from the non-responder study which included 391 subjects.

Of the 3839 women that were included during pregnancy, 2132 (56%) answered the questionnaire six week postnatal. This is a high loss to follow-up, and most probably due to forgetfulness or failing routines for follow-up among the health professionals. One would also expect a certain degree of exhaustion among GPs and midwives in a study of such longevity [26]. If the loss to follow-up is assigned to forgetfulness or low attention during follow-up both among participants and health professionals, it may be assumed that the participants are lost at random. This is supported by the observation that baseline characteristics between dropouts in the two cohorts only differed for single mothers. If so, even a loss to follow-up of 60% is shown not to represent important bias [27]. Importantly, we had almost no active withdrawals in either cohort.

We found no significantly reduced parental smoking prevalence in the intervention cohort six weeks postnatal when we performed a stratified analysis according to smoking behaviour at inclusion. The high quitting rate observed in both cohorts was apparently due to spontaneous quitting before inclusion. Therefore only a hardcore of resilient smokers were left to intervene on, women who had taken their choice of continued smoking during pregnancy probably despite knowledge of the harmful effects and social stigma. In this respect multiparous women who smoked more than 10 cigarettes a day were at highest risk. This is in agreement with results from several other smoking intervention studies in pregnancy [28,29].

We found a very low prevalence of reported indoor smoking in both cohorts which may indicate that there was awareness in both cohorts of the harmful effect of SHS on

Table 7: Logistic regression of background factors predicting maternal smoking at inclusion* among pre-pregnancy smokers

	Adjusted odds ratio for smoking at inclusion aOR	95% CI	p-value
Maternal age < = 24 years vs.	reference		
> 31 years	1.57	0.82–3.02	0.18
Primiparous vs.	reference		
multiparous	1.71	1.09–2.69	0.02
Married or cohabitant vs.	reference		
living single	3.01	1.43–6.34	0.004
Mother smoking <= 10 cig. a day vs.	reference		
> 10 cig. a day	3.07	2.04–4.64	< 0.001

*(1 = smoking, n = 150) (0 = non-smoking = spontaneous quitters, n = 362)

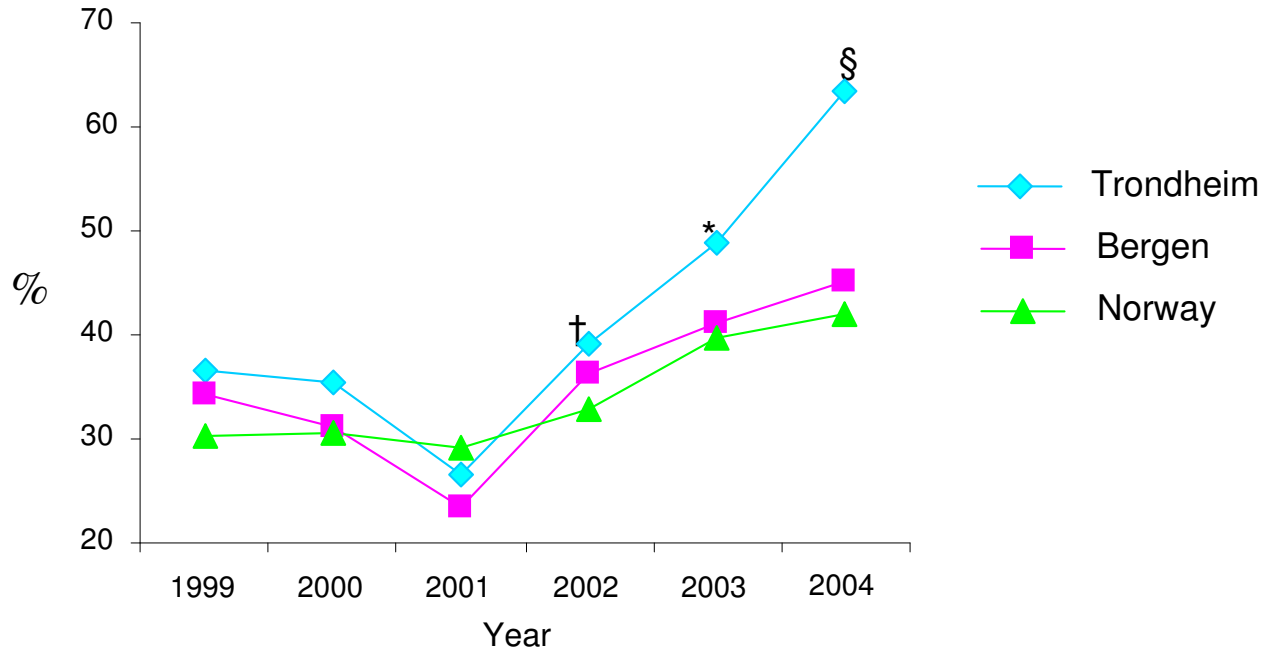

Figure 2
Proportion of women who stopped smoking during pregnancy in Trondheim, Bergen and Norway 1999–2004. Data from the Medical Birth Registry in Norway. †p = 0.43 for difference in smoking cessation between Trondheim and Bergen 2002. *p = 0.03 for difference in smoking cessation between Trondheim and Bergen 2003. §p = < 0.001 for difference in smoking cessation between Trondheim and Bergen 2004.

small children, but answering according to social desirability may also explain this result.

Smoking cessation in Trondheim and Bergen

The MBR aggregated data showed a higher quitting rate during pregnancy in Trondheim than in Bergen after the intervention programme in the PACT study commenced. The MBR data for Trondheim comprise both women participating in the PACT study and non-participating women. The women in the two cities had been exposed for the same national legislation and anti smoking campaigns. What differ between the two cities are the PACT study and the fact that the intervention programme was adopted as an integrated part of the recommended maternity care life-style counselling programme throughout Trondheim. An interpretation may be that the PACT study in this way have increased the attention on the health hazards of smoking in pregnancy, both among GPs and midwifes, but also among the parents to be, and in this way brought about the significantly higher smoking cessation rate observed in the MBR data for Trondheim compared to Bergen.

Conclusion

A new smoking intervention programme as part of a multiple health behaviour intervention did not reduce parental smoking prevalence during pregnancy in the intervention cohort compared to the control cohort. Most women were spontaneous quitters and gave up smoking early in pregnancy before the intervention took place. We found a low indoor smoking prevalence in both cohorts, which may reflect a high degree of awareness of the harmful effects of smoking during pregnancy. Data from the MBR showed a higher quitting rate in Trondheim compared to Bergen in 2003 and 2004 which may have been facilitated by the supplemental attention on smoking behaviour the PACT study initiated.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

TØ and OS participated in the design and coordination of the study and drafted the manuscript. JAJ participated in the design of the study and performed statistical analysis.

RJ conceived of the study, and participated in its design and coordination and helped draft the manuscript. All authors read and approved the final manuscript.

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ORIGINAL RESEARCH

Assessing atopic disease in children two to six years old: reliability of a revised questionnaire

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Abstract

Background: Primary intervention – reducing second hand smoking (SHS), indoor dampness, and increased intake of omega-3-fatty acids – for allergic diseases such as asthma, rhinoconjunctivitis, and eczema/dermatitis in children was started in Trondheim in 2002. To our knowledge, no validated or reliable questionnaires for the study age groups were available.

Aims: To test the reliability of a revised questionnaire for studying atopic disease in children two to six years old in Trondheim.

Methods: Seventy-seven families were invited to fill in a questionnaire adapted from the ISAAC protocol which was made appropriate for the age group studied. Completed questionnaires and information from medical records were compared, and the agreement was analysed by Kappa statistics and proportional agreement.

Results: Agreement was excellent for questions reporting current information such as doctor-diagnosed asthma (κ=0.88), whether or not the child had had an allergy test (κ=0.82), and use of antibiotics (κ=0.81). The agreement was good for questions concerning doctor or hospital treatment for asthma (κ=0.59), medication for asthma (κ=0.58), symptoms of eczema (κ=0.56), medication for allergic disease (κ=0.45), and past infections (κ=0.53).

Conclusion: Questions on asthma diagnosis, allergy testing, and use of antibiotics were reliable. Questions on medical treatment for eczema, allergic rhinoconjunctivitis and infections were less reliable, representing a potential source of information bias and possible misclassification.

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Keywords questionnaires, reliability, primary prevention, asthma, allergy, allergic rhinitis, allergic conjunctivitis, eczema

Introduction

The municipality of Trondheim, Norway, was chosen for a large study on the effectiveness of primary prevention for asthma, rhinoconjunctivitis, and eczema/dermatitis, in children from birth up to two years of age – the Prevention of Allergy among Children in Trondheim study (PACT).[1] The interventions included reducing second-hand smoking (SHS) and indoor dampness, and increasing intake of omega-3-fatty acids.

After searching on Medline and the Cochrane database, no validated or reliable questionnaires for assessing the prevalence of risk factors and the incidence of asthma, rhinoconjunctivitis and eczema/dermatitis in children aged two to six years old were found. Most of the existing questionnaires were variations of those used in the ISAAC study[2] for use in older children.

To evaluate the effect of the intervention, existing ISAAC questionnaires had to be revised for the study age group. Three main requirements were specified for the development of the questionnaire: first, the extent of the questionnaire should be sufficient to estimate symptoms and complaints consistent with asthma, rhinoconjunctivitis, and eczema/dermatitis, and to

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describe use of health care services and treatment for these diseases; second, the questionnaire should be possible to complete during a maternal and child health centre consultation of average duration (i.e. 30 minutes); and third, it should be designed to obtain satisfactory validity.

The aim of this study therefore was to test the reliability of a new questionnaire used in the PACT study for studying symptoms of asthma, rhinoconjunctivitis, and eczema/dermatitis among children two to six years old.

Methods

A collaborative group of primary care physicians and maternity and child healthcare nurses was established to develop the questionnaire. A modified focus group evaluation – which included a group of 12 parents (six couples) – was then performed to assess whether or not the requirements were met, and to study the feasibility of the questionnaire. Comments on the extent and comprehensibility of the questionnaire were collected from this group.

After development, the questionnaire consisted of 26 questions on symptoms of allergic diseases, and two questions on infectious diseases and hospitalisation in the first two years of life. Ten of the questions revealed information that could be expected to be found in medical records. The reliability was assessed by evaluating the agreement between answers to these ten questions and information obtained from various medical records in primary health care, paediatric practices and in hospitals.

The study group consisted of two populations of children in Trondheim. The first was a random group of parents of 47 children with few incident cases (pilot study of the questionnaire). To increase the number of incident cases a second group of parents of 30 children was randomly selected among those with a positive answer to questions on doctor-diagnosed asthma and/or parental-reported eczema from the control group in the PACT study.

We obtained written consent from 38 parents (of 47 invited) in the pilot study, and results from these are used in the analysis. A brief feasibility and time consumption questionnaire was completed by 36 participants in the pilot study. For both groups, information was requested from their primary physician, together with information in medical records from the municipality emergency centre, hospital admissions, maternity ward centres and paediatricians in Trondheim. For 66 of the 77 (86%) participants the information was sufficient to complete all 10 items (see Table 1).

The questionnaire was evaluated by comparing the answers given in the questionnaires with the information obtained from the children's medical records. Two investigators assessed all information in the health records, and then both completed a registration form for each participant. When doubt or disagreement in interpreting the medical records was experienced, consensus between the investigators was obtained through discussion. The data collection was finished in 2001.

For statistical analysis, we used SPSS for Windows® ver. 12.0 and Excel. To analyse the agreement between answers given in the questionnaire and information obtained from different medical records, estimated observed agreement, proportional agreement, and Kappa statistics with 95% confidence intervals (CI) were used.[3,4]

The study was approved by the Regional Committee for Medical Research Ethics and the establishment of patient Register was licensed by the Norwegian Data Inspectorate.

Results

Feasibility and time consumption

The mean age of the 36 children in the feasibility study was 33.4 months, with a range of 24-66 months. Median time spent completing the questionnaire was 6.5 minutes (range 1-15). Eighteen of 36 participants managed to complete the form whilst waiting for the maternity centre consultation; the rest completed it after the consultation.

Modified focus group evaluation

The modified focus group evaluation – which included six parental couples who were invited to comment on the design

Table 1. Patient numbers and participation.

Number of participants invited	Questionnaires in reliability study	Feasibility and time consumption questionnaire	Modified focus group evaluation	Written consent and information obtained
Pilot study				
47 children invited at maternity care centres	38	36 children	6 parents	38 children
Control group PACT				
30 children reported having asthma and/or eczema in questionnaire	28			28 children

Table 2. Agreement between 10 questions from the questionnaire, and medical record data.

Questionnaire	Obtained from records	N	Kappa (CI 95 %)	OA	n	PA yes/no
1. Has your child ever been diagnosed as having asthma by a doctor?	Asthma/wheezing > 2 obstructive episodes	53	0.88 (0.76-1.0)	0.94 (50/53)	23	0.93/0.95
2. Has your child ever been treated by doctor or hospitalised for asthma?	Treatment for asthma	31	0.59 (0.31-0.88)	0.80 (25/31)	18	0.84/0.75
3. In the past 12 months, has your child used any medicines, pills, puffers or other medication for wheezing or asthma?	Asthma medication prescribed	31	0.58 (0.28-0.88)	0.80 (25/31)	19	0.85/0.73
4. Has your child ever had an itchy rash coming and going for at least 6 months?	Eczema	64	0.56 (0.38-0.75)	0.78 50/64	32	0.72/0.41
5. In the past 12 months, has your child used any medicines, ointments, creams, pills or other medications for an itchy skin rash or eczema?	Eczema medication prescribed	65	0.33 (0.11-0.54)	0.71 (46/65)	26	0.49/0.80
6. In the past 12 months, has your child used any medicines for allergic disease?	Allergy medication prescribed	65	0.45 (0.08-0.82)	0.91 (59/65)	7	0.50/0.95
7. Has your child ever had an allergy test, skin prick test or blood test?	Allergy test	64	0.82 (0.66-0.97)	0.92 (59/64)	21	0.87/0.94
8. Has your child ever been treated by doctor or hospitalised for: Hay fever, blocked nose or itchy-watery eyes? Eczema? Urticaria?	Treated by physician or hospitalised for atopic disease?	63	0.39 (0.12-0.66)	0.80 (51/63)	9	0.50/0.88
9. Has your child ever had any of the following diseases? Common cold? Ear infection? Bronchitis? RS-virus infection? False croup? Pneumonia? Urinary tract infection? Gastric flu/tummy bugs?	Infection reported in record	66	0.53 (0.30-0.76)	0.82 (54/66)	52	0.88/0.65
10. Are any of the following diseases treated with penicillin/antibiotics?	Antibiotic treatment reported in records	53	0.81 (0.65-0.97)	0.91 (48/53)	29	0.92/0.89

N = number in analysis, $0 < \kappa < 0.4$ denotes poor agreement, $0.4 < \kappa < 0.75$ denotes good agreement, $\kappa > 0.75$ denotes excellent agreement
OA = Observed agreement, n = number of reported yes, PA = Proportional agreement for yes/no

and comprehensibility of the questionnaire – led to the rephrasing of some questions. As an example, the concept "infectious disease" was poorly understood and replaced with a list of "some of the following diseases" (see Question 9, Table 2). Overall, there were a few comments and proposals for amendments to the questionnaire.

Agreement between the questionnaire and information in medical records

Ten questions – for which the answers given could be expected to be verified by information in the children's medical records – were selected for reliability testing. If introductory questions were answered by "no", the parents were instructed to go to the next section of the questionnaire leading to different numbers in the analysis (N). The answer "don't know" was excluded from the main analysis. The number of "don't knows" varied between zero and two in the 10 questions.

The results are shown in Table 2. The agreement, assessed as kappa, varied considerably for the different questions. There was excellent agreement for questions reporting actual information like doctor-diagnosed asthma (κ=0.88, (0.76-1.0)) and whether or not the child had had an allergy test (κ=0.82, (0.66-0.97). The proportion of observed agreement for these two questions was also very high, 0.94 and 0.92, respectively. Proportional agreement was also very high both for "yes" and "no", 0.93 and 0.95, respectively.

The agreement was good for questions concerning doctor or hospital treatment for asthma, symptoms of eczema, and medication for allergic and past infections. The agreement for medication for asthma was good, while the agreement was poor for eczema medication (κ=0.33, [0.11-0.54]). The agreement was also poor for doctor treatment or hospitalisation for hay fever, eczema and urticaria.

Discussion

The families lived in areas of mixed socio-economic population and were considered representative for the current age group in Trondheim.

We found excellent agreement for questions reporting factual information such as whether or not the child had had an allergy test or doctor-diagnosed asthma, use of antibiotics, and a history of specific diseases. The potential for classification errors, however, was considerable for questions on treatment for skin rash or eczema, any medicines for allergic disease, and whether the child had been treated by a doctor or had been hospitalised for allergic complaints or diseases.

We chose to test the reliability of the questionnaire by comparing the parents' answers to the information retrieved from medical records. This method has been widely used for both reliability testing and for validating questionnaires in other medical conditions, but to our knowledge, not for the diseases investigated in this study.[5-7] A first prerequisite for a correct classification of reported disease endpoints is that the information given is reliable. Diagnosis of atopic diseases such as asthma, rhinoconjunctivitis, and eczema/dermatitis is based on the medical history, repeated consultations, and knowledge of the child's family and living conditions. As medical records give an overview of all contacts in primary and specialist care over time, diagnosis of atopic diseases is probably best based on such information. Using medical records as a "reference standard" for disease prevalence is, however, only satisfactory provided that the physicians apply diagnostic criteria correctly. Whether the doctor-diagnosed diseases meet the standard criteria for the current diseases, and thereby the validity of the questionnaire, is being studied in a separate endpoint and validity study.

The questionnaire information on doctor-diagnosis of asthma is highly reliable, which is in accordance with findings in the Obstructive Lung Disease in Northern Sweden Study, where the same question was evaluated.[8] A Finnish study on the reliability of a questionnaire for asthma, allergic rhinitis, and conjunctivitis presented similar findings.[9]

A better agreement could be expected for doctor or hospital treatment for asthma. The lack of excellent agreement could be ascribed to a perception that the question was understood as a specific question about hospital admission or hospital treatment only. In four questionnaire responses the parents reported no doctor treatment or hospitalisation for asthma, but the records actually provided information on multiple primary care consultations for asthma. No hospitalisation was confirmed. Rephrasing the question would probably increase the agreement level.

A higher agreement for the question on medical treatment for asthma could also be expected. A higher proportional agreement for "yes" indicates that a positive response is more reliable than a negative response. From the findings in the medical records, our interpretation was that some parents seemed to misapprehend, indicating that asthma medication was perceived as an anti-allergic medicine.

The kappa value for the question on eczema medication was low. However, observed agreement and proportional agreement for "no" was high. This paradox is discussed in detail by Feinstein and Cicchetti.[10] This question is very specific for detecting children who are not being treated for eczema. One interpretation could be that many parents treat their children's eczema themselves with over-the-counter medication, and do not consult their physician for this problem.

A low kappa value for use of anti-allergic medication in the past year was found. A high observed agreement, a relatively low proportional agreement for "yes", and very high proportional agreement for "no" was observed. The paradox of high agreement and low kappa is in this case probably due to prevalence bias, with only five positive responders.[11] As a consequence, this question is unsuitable for detecting children treated for allergy, but its specificity for identifying children not treated for allergy is excellent.

There was poor agreement with a low report on doctor-treated or hospitalisation for hay fever, eczema and urticaria. Observed agreement for this question, and proportional agreement for "no", was high. Together with a relatively low proportional agreement for "yes" this could be due to a perception that the question was exclusively about hospital admission or hospital treatment. Consequently, a more precise question on contact with health services due to allergic conditions is required. For questions 5, 6 and 8, therefore, a positive answer is prone to misclassification and thereby unreliable. A negative answer, however, contains less classification error, and is in this respect more trustworthy. All three should be specified in more detail and retested.

The study population consisted of two groups of children, both randomly selected from the control cohort of PACT. A possible bias might be introduced by the selection of the second group, stratified by positive answers to having asthma or allergic disease. An increased awareness on atopic disease

among these parents may affect the reliability of the answers given. For the disease endpoints 'asthma' and 'eczema', however, they would be representative as the awareness of diagnostic information would be the same for corresponding groups of parents. The method may yet increase the reliability for some of the other questions. However, this method was chosen as a manageable way to collect enough data from different medical records.

Conclusions

A newly developed questionnaire for use in the PACT study for estimating the prevalence of asthma, rhinoconjunctivitis, and eczema/dermatitis among children aged two to six years old was tested for reliability. The questionnaire was adapted from the ISAAC protocol, was modified to suit the age of the study population, and contained questions on symptoms, investigation, diagnosis and treatment for atopic disease. We found that the agreement between parent-reported information and the information obtained by examining medical records was good to excellent for the questions estimating prevalence of disease. The questionnaire may possibly underestimate the use of anti-allergic medication, as well as doctor treatment for allergic disease. No question overestimated the prevalence of atopic symptoms or medication use.

It appears to be important to differentiate between the information based on parents' opinions and experience, and the information they have shared with and/or received from the health services on any level. Still, the deficiencies in communication and in the understanding between parents and medical staff, and the shortcomings in updating the medical records, could impair any agreement. Knowledge of the agreement is, however, important as inferences of research results should include the potential for misclassification.

Conflict of interest declaration

None declared.

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Paper 4

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Appendix 1

Questionnaire Q1:
Questions on risk factors and behaviour during pregnancy in Norwegian

60291

Barneallergistudien i Trondheim

Spørreskjema om arv og livsstilsfaktorer i svangerskapet

Skriv tydelige tall og kryss. Bruk **svart** eller **blå** penn.

Utfylt dato (dd.mm.åå) ☐☐.☐☐.☐☐

Spørsmål om arv

1. Hvor mange barn har du og barnefaren tilsammen ?
   (ta med fellesbarn og særkullsbarn, **ikke** fosterbarn og adoptivbarn).

   Ingen barn : ☐ (kryss)

   Antall barn : ☐ gutter ☐ jenter

---

2. Har du, barnefaren eller noen av barna **noen gang** hatt astma, eksem eller allergi i øyne/nese ?

   ☐ Ja ☐ Nei

   Hvis nei, gå til spørsmål 8.
   Hvis ja, kryss av for de familiemedlemmer det gjelder (flere kryss) :

	Astma	Eksem	Allergi i øyne/nese
Deg selv	☐	☐	☐
Barnefaren	☐	☐	☐
Fellesbarn	☐	☐	☐
Dine særkullsbarn	☐	☐	☐
Barnefarens særkullsbarn	☐	☐	☐

---

3. Har du, barnefaren eller fellesbarn **noen gang** hatt astmasykdom ?

   ☐ Ja ☐ Nei

   Hvis nei, gå til spørsmål 5.
   Hvis ja, angi alder i dag, når astmasykdommen startet, om sykdommen fortsatt er til stede, og når den eventuelt sluttet.

	Alder i dag	Startalder astma	Har fortsatt astma (kryss)	Sluttalder astma
Deg selv	☐☐ år	☐☐ år	☐	☐☐ år
Barnefaren	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 1	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 2	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 3	☐☐ år	☐☐ år	☐	☐☐ år

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4. Har, eller har du, barnefaren eller fellesbarn hatt astmaplager eller brukt astmamedisiner de **siste 12 måneder** ? ☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av astmaplager siste 12 måneder				Brukt astmamedisin siste 12 måneder ?	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Deg selv	☐	☐	☐	☐	☐	☐
Barnefaren	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

5. Har, eller har du, barnefaren eller fellesbarn hatt eksemplager eller bruk eksemmedisin de **siste 12 måneder** ? ☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av eksemplager siste 12 måneder				Brukt eksemmedisin siste 12 måneder ?	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Deg selv	☐	☐	☐	☐	☐	☐
Barnefaren	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

6. Har, eller har du, barnefaren eller fellesbarn hatt allergi i øyne/nese eller brukt allergimedisiner ? ☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 8.

Hvis ja, kryss av for de det gjelder: (flere kryss)

	Allergi mot				Brukt allergimedisin siste 12 måneder ?	
	Pollen	Dyrehår	Husstøv/ midd	Andre	Ja	Nei
Deg selv	☐	☐	☐	☐	☐	☐
Barnefaren	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

7. Hvis du, barnefaren eller fellesbarn har allergi i øyne/nese, hvordan er det påvist ?

Kryss av for de det gjelder :

	Allergi påvist ved blodprøve ?			Allergi påvist ved prikk(hud)-testing ?		
	Ja	Nei	Vet ikke	Ja	Nei	Vet ikke
Deg selv	☐	☐	☐	☐	☐	☐
Barnefaren	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

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Spørsmål om bolig / innemiljø i svangerskapet nå

8. I hvilken type bolig bor du ? (ett kryss)

- Enebolig/våningshus uten sokkel/kjeller ☐
- Enebolig/våningshus med sokkel/kjeller ☐
- Sokkelleilighet i enebolig ☐
- Tomannsbolig, firemannsbolig ☐
- Rekkehus/kjedehus ☐
- Terrassehus ☐
- Boligblokk/bygård ☐
- Annen bolig ☐

9. Boligens byggeår ? (årstall) ☐☐☐☐

Hvilket år flyttet du inn i boligen ? ☐☐☐☐

10. Eier du/dere boligen ?

- Ja, som selveiere ☐
- Ja, i borettslag ☐
- Nei ☐

11. Boligens boareal (cirka) ? ☐☐☐ m^2

12. Hvor mange personer bor det for tiden i boligen ? ☐☐

13. Hvor ofte vaskes boligen ? ☐☐ ganger per måned

Hvor ofte støvsuges boligen ? ☐☐ ganger per måned

14. Har boligen sentralstøvsuger ? ☐ Ja ☐ Nei

15. Hvor mange timer oppholder du deg i gjennomsnitt i boligen ?

I boligen ☐☐ timer per døgn

I eget soverom ☐☐ timer per døgn

16. Hvilke av følgende husdyr oppholder seg i boligen ? (flere kryss)

- Hund ☐
- Katt ☐
- Andre pelsdyr (marsvin, kanin o.l.) ☐
- Fugl ☐
- Andre dyr ☐
- Ingen dyr ☐

17. Bor du på gårdsbruk ? ☐ Ja ☐ Nei

Hvis ja, hvilke husdyr er det på gården ? (flere kryss)

- Kyr ☐
- Gris ☐
- Sau ☐
- Hest ☐
- Fjørfe ☐
- Andre husdyr ☐
- Ingen husdyr ☐

18. Hvilke energikilder brukes til oppvarming av boligen ? (flere kryss)

- Elektristitet ☐
- Vedfyring ☐
- Olje ☐
- Fjernvarme ☐
- Annet ☐

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19. Har, eller har boligen hatt noen av følgende problemer ?
(besvar alle spørsmål)

	Ja	Nei	**Hvis ja**, er problemet utbedret ? Ja, utbedret	Nei, ikke utbedret
Mugglukt eller kjellerlukt	☐	☐	☐	☐
Aviser og pappesker blir ved lagring 'fuktige'	☐	☐	☐	☐
Dugg på vinduer (utenom ved dusjing, fosskoking og sterk kulde)	☐	☐	☐	☐
Fuktflekker på vegg eller tak (fuktflekker som skyldes mindre søl med vann regnes ikke med her)	☐	☐	☐	☐
Vannlekkasjer fra sanitærinstallasjoner (rør, kraner, dusj, vask o.l.)	☐	☐	☐	☐
Vannlekkasjer fra yttertak	☐	☐	☐	☐
Vannlekkasjer fra grunnen/oversvømmelse	☐	☐	☐	☐
Blærer, bobler i eller misfarging av gulvbelegg	☐	☐	☐	☐
Ingen problemer	☐			

20. Hvilke av følgende ventilasjonsutstyr er installert i boligen ?

	Ja	Nei
A. Egen avtrekksvifte over komfyr	☐	☐
B. Egen avtrekksvifte i ventil i yttervegg på våtrom	☐	☐
C. Ventiler i yttervegg/vinduskarm eller luftevindu	☐	☐
D. Sentral avtrekksventilasjon (sentral vifte som gir avtrekk fra bad, toalett og kjøkken)	☐	☐
E. Ventilasjonsanlegg (sentral vifte som gir avtrekk fra bad, toalett og kjøkken, og en sentral vifte som gir tilførsel av luft til oppholdsrom og soverom)	☐	☐

Hvis ja på D eller E - Omtrent hvor mange **timer per døgn** er det for tiden i bruk : ☐☐ Skriv 0 hvis ikke i bruk

- Omtrent hvor mange **ganger per år** skiftes filter : ☐☐ Skriv 0 hvis ingen

21. Hvor ofte gjennomluftes boligen for tiden ved å åpne vindu eller dører i minimum 3-5 minutter ?
(ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang om dagen ☐
- 1 gang om dagen ☐
- 2 ganger daglig ☐
- 3 eller flere ganger daglig ☐

22. Hvilke av følgende aktiviteter foregår **daglig i boligen uten** at elektrisk avtrekksvifte/ ventilasjon benyttes ? (flere kryss)

- Tørking av tøy ☐
- Koking av mat ☐
- Bruk av tørkeskap/tørketrommel ☐
- Dusjing (mer enn 5 minutter) ☐
- Bruk av luftfukter ☐
- Ingen aktiviteter ☐

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23. I hvilken etasje av bygningen er **ditt** soverom ?
(ett kryss)

- Sokkel ☐
- Kjeller ☐
- 1. etasje ☐
- 2. etasje eller høyere ☐

24. Sover **du** for tiden med åpent vindu ?

☐ Ja ☐ Nei

25. Hva slags dyne eller pute bruker **du** nå ?

	Dyne	Pute
Syntetiske fibre	☐	☐
Dun	☐	☐
Annet	☐	☐
Bruker ikke dyne eller pute	☐	☐

26. Hvor gammel er **din** nåværende dyne, pute og madrass ?

Alder (under 1 år skriv 0)

- Dyne ☐☐ år
- Pute ☐☐ år
- Madrass ☐☐ år

27. Hvor ofte vaskes sengetøyet **ditt** ? ☐☐ ganger per måned

Hvor ofte rengjøres madrassen **din** ? ☐☐ ganger per **år**

28. Tørkes sengetøyet i tørketrommel ? ☐ Ja ☐ Nei

29. Hvor mange våtrom og andre rom har **vinylgulv med gulvvarme** ? (Skriv 0 hvis ingen)

- Våtrom (bad, vaskerom, WC) ☐ antall rom
- Andre rom ☐ antall rom

30. Hvilke materialer er brukt **på gulv** i soverommet og i oppholdsrommet **du** bruker mest ?
(flere kryss)

	Gulv i ditt soverom	Gulv i oppholdsrom du bruker mest
Heldekkende tepper	☐	☐
Vinyl (PVC-plast)	☐	☐
Furu tregulv	☐	☐
Parkett/andre harde materialer	☐	☐
Annet	☐	☐

31. Hvilke overflater har **veggene** i soverommet og i oppholdsrommet **du** bruker mest ?
(flere kryss)

	Veggene i ditt soverom	Veggene i oppholdsrom du bruker mest
Ubehandlet/lutet trepanel	☐	☐
Malt/lakkert trepanel	☐	☐
Annen malt/lakkert overflate	☐	☐
Annen overflate	☐	☐

32. Har det blitt gjort noen av følgende endringer i boligen **siste 12 måneder** ? (besvar alle spørsmål)

	Ja	Nei
Nytt furu trepanel eller furu gulv	☐	☐
Nytt vinyl gulv (PVC-plast)	☐	☐
Liming av tapet, strie, gulvbelegg etc.	☐	☐
Maling, lakkering	☐	☐
Andre endringer	☐	☐

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Spørsmål om kosthold

Fra svangerskapets start til nå

33. Hvor ofte i gjennomsnitt spiser du torsk, sei eller annen mager fisk til middag ? (ett kryss)

- ☐ Aldri
- ☐ Sjeldnere enn 1 gang i uken
- ☐ 1 gang i uken
- ☐ 2 ganger i uken
- ☐ 3 ganger i uken
- ☐ 4 ganger i uken eller oftere

34. Hvor ofte i gjennomsnitt spiser du uer, kveite, laks, ørret, sild, makrell eller annen fet fisk til middag ? (ett kryss)

- ☐ Aldri
- ☐ Sjeldnere enn 1 gang i uken
- ☐ 1 gang i uken
- ☐ 2 ganger i uken
- ☐ 3 ganger i uken
- ☐ 4 ganger i uken eller oftere

35. Hvor ofte i gjennomsnitt tar du tran eller fiskeoljekapsler ? (ett kryss)

- ☐ Aldri
- ☐ Sjeldnere enn 1 gang i uken
- ☐ 1 gang i uken
- ☐ 2 ganger i uken
- ☐ 3 ganger i uken
- ☐ 4 ganger i uken eller oftere

36. Hvor mange brødskiver i gjennomsnitt spiser du der pålegget består av fet fisk (sild, sardiner, makrell, laks ol.) ? (ett kryss)

- ☐ Aldri
- ☐ Mindre enn 1 skive i uken
- ☐ 1-2 skiver i uken
- ☐ 3-6 skiver i uken
- ☐ 1-2 skiver daglig
- ☐ 3-4 skiver daglig
- ☐ 5 eller flere skiver daglig

37. Hvor ofte spiser du i gjennomsnitt grønnsaker til middag eller som egen rett (her menes rå eller kokte grønnsaker) ? (ett kryss)

- ☐ Aldri
- ☐ Sjelden
- ☐ Omtrent 1 gang i uken
- ☐ 2-3 ganger i uken
- ☐ 4-5 ganger i uken
- ☐ Omtrent daglig

38. Hva slags type fett blir brukt til matlaging (ikke på brødet) i din husholdning ? (flere kryss)

- ☐ Meierismør
- ☐ Hard margarin
- ☐ Bløt (soft) margarin
- ☐ Smør/margarin blanding
- ☐ Soyaolje
- ☐ Olivenolje

Spørsmål om røykevaner

39. Røykte du eller ektefelle/ samboer ved svangerskapets start ?

	Nei, røykte ikke	Ja, røykte ukentlig	Ja, røykte daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

40. Røyker du eller ektefelle/ samboer nå ?

	Nei, røyker ikke	Ja, røyker ukentlig	Ja, røyker daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

41. Røykes det **innendørs** hjemme ?

Nei, det røykes ikke innendørs	Ja, det røykes ukentlig innendørs	Ja, det røykes daglig innendørs
☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

Appendix 2

Questionnaire Q2:
Questions on risk factors and behaviour at 6 weeks after birth in Norwegian

22600

Barneallergistudien i Trondheim

Spørreskjema om livsstilsfaktorer ved 6 ukers alder

Skriv tydelige tall og kryss. Bruk **svart** eller **blå** penn.

Utfylt dato (dd.mm.åå) ☐☐.☐☐.☐☐

Spørsmål om barnet

1. Er barnet tvilling ? ☐ Ja ☐ Nei **Hvis tvilling**, svar på alle spørsmålene for tvilling I, deretter svar på spørsmål 1-6 og 47-51 for tvilling II på eget skjema.

---

2. Barnets fødselsvekt ? ☐☐☐☐ gram og fødselslengde ? ☐☐ cm

---

3. Hvor mange søsken har barnet ?
(ta med fellesbarn og særkullsbarn, **ikke** fosterbarn og adoptivbarn)
Ingen søsken : ☐ (kryss)
Antall søsken : ☐ brødre ☐ søstre

---

4. Når ble barnet født i forhold til beregnet ultralydtermin ? (ett kryss)
   - Tidligere enn 2 uker før beregnet ultralydtermin ☐
   - Mellom 3 uker før og 2 uker etter beregnet ultralydtermin ☐
   - Senere enn 2 uker etter beregnet ultralydtermin ☐

---

5. Har barnet blitt vaksinert ? ☐ Ja ☐ Nei
Hvis ja, hvilken vaksine ? ☐ BCG ☐ Hepatitt ☐ Andre _____

---

6. Har barnet hatt noen av sykdommene nedenfor ?

	Ja	Nei	Hvis ja, antall ganger	Er noen av sykdommene behandlet med penicillin/antibiotika ? Ja	Nei	Vet ikke	Hvis ja, hvor mange behandlinger
Forkjølelse	☐	☐	☐	☐	☐	☐	☐
Ørebetennelse	☐	☐	☐	☐	☐	☐	☐
Bronkitt	☐	☐	☐	☐	☐	☐	☐
RS-virusinfeksjon	☐	☐	☐	☐	☐	☐	☐
Falsk krupp	☐	☐	☐	☐	☐	☐	☐
Lungebetennelse	☐	☐	☐	☐	☐	☐	☐
Urinveisinfeksjon	☐	☐	☐	☐	☐	☐	☐
Mage-tarminfeksjon	☐	☐	☐	☐	☐	☐	☐

---

7. Foreldrenes sivilstatus: ☐ Gift ☐ Samboer ☐ Enslig ☐ Annet

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Spørsmål om foreldre og søsken

8. Har mor, far eller noen av barna **noen gang** hatt astma, eksem eller allergi i øyne/nese ?

☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 14.
Hvis ja, kryss av for de familiemedlemmer det gjelder (flere kryss) :

	Astma	Eksem	Allergi i øyne/nese
Mor	☐	☐	☐
Far	☐	☐	☐
Fellesbarn	☐	☐	☐
Dine særkullsbarn	☐	☐	☐
Barnefarens særkullsbarn	☐	☐	☐

---

9. Har, eller har mor, far eller fellesbarn **noen gang** hatt astmasykdom ? ☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 11.
Hvis ja, angi alder i dag, når astmasykdommen startet, om sykdommen fortsatt er til stede, og når den eventuelt sluttet.

	Alder i dag	Startalder astma	Har fortsatt astma (kryss)	Sluttalder astma
Mor	☐☐ år	☐☐ år	☐	☐☐ år
Far	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 1	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 2	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 3	☐☐ år	☐☐ år	☐	☐☐ år

---

10. Har, eller har mor, far eller fellesbarn hatt astmaplager eller brukt astmamedisiner de **siste 12 måneder** ? ☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av astmaplager siste 12 måneder				Brukt astmamedisin siste 12 måneder	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

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11. Har, eller har mor,far eller fellesbarn hatt eksemplager, eller brukt eksemmedisin de **siste 12 måneder** ? ☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av eksemplager siste 12 måneder				Brukt eksemmedisin siste 12 måneder ?	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

12. Har, eller har mor, far eller fellsbarn hatt allergi i øyne/nese, eller brukt allergimedisiner ?

☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 14.
Hvis ja, kryss av (flere kryss) for de det gjelder :

	Allergi mot				Brukt allergimedisin siste 12 måneder ?	
	Pollen	Dyrehår	Husstøv/ midd	Andre	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

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13. Hvis mor, far eller fellsbarn har allergi i øyne/nese, hvordan er det påvist ?
Kryss av for de det gjelder :

	Allergi påvist ved blodprøve ?			Allergi påvist ved prikk(hud)-testing ?		
	Ja	Nei	Vet ikke	Ja	Nei	Vet ikke
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

---

14. Kryss av om mor hadde noen av følgende plager i siste svangerskap. Oppgi i hvilken periode, og om mulig navn på medisiner som ble brukt.

	Plager i siste svangerskap ?	Periode i svangerskapet (flere kryss) 0-3 mnd	4-6 mnd	7-9 mnd	Medisinnavn
Svangerskapsblødning	☐	☐	☐	☐	_____
Svangerskapsforgiftning	☐	☐	☐	☐	_____
Forhøyet blodtrykk	☐	☐	☐	☐	_____
Svangerskapsdiabetes	☐	☐	☐	☐	_____
Diabetes, insulinbehandlet	☐	☐	☐	☐	_____
Diabetes, tablettbehandlet	☐	☐	☐	☐	_____
Soppinfeksjon i skjeden	☐	☐	☐	☐	_____
Skjedekatarr/uvanlig utflod	☐	☐	☐	☐	_____
Forkjølelse	☐	☐	☐	☐	_____
Influensa	☐	☐	☐	☐	_____
Bronkitt	☐	☐	☐	☐	_____
Lungebetennelse	☐	☐	☐	☐	_____
Astma	☐	☐	☐	☐	_____
Eksem	☐	☐	☐	☐	_____
Allergi i øyne /nese	☐	☐	☐	☐	_____
Andre plager	☐				
Ingen plager	☐				

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Spørsmål om bolig / innemiljø nå

15. I hvilken type bolig bor **barnet** ? (ett kryss)

- Enebolig/våningshus uten sokkel/kjeller ☐
- Enebolig/våningshus med sokkel/kjeller ☐
- Sokkelleilighet i enebolig ☐
- Tomannsbolig, firemannsbolig ☐
- Rekkehus/kjedehus ☐
- Terrassehus ☐
- Boligblokk/bygård ☐
- Annen bolig ☐

16. Boligens byggeår ? (årstall) ☐☐☐☐

Hvilket år flyttet du inn i boligen ? ☐☐☐☐

17. Eier du/dere boligen ?

- Ja, som selveiere ☐
- Ja, i borettslag ☐
- Nei ☐

18. Boligens boareal (cirka) ? ☐☐☐ m^2

19. Hvor mange personer bor det for tiden i boligen ? ☐☐

20. Hvor ofte vaskes boligen ? ☐☐ ganger per måned

Hvor ofte støvsuges boligen ? ☐☐ ganger per måned

21. Har boligen sentralstøvsuger ? ☐ Ja ☐ Nei

22. Hvor mange timer oppholder **barnet** seg i gjennomsnitt i boligen ?

I boligen ☐☐ timer per døgn

I eget soverom ☐☐ timer per døgn

23. Hvilke av følgende husdyr oppholder seg i boligen ? (flere kryss)

- Hund ☐
- Katt ☐
- Andre pelsdyr (marsvin, kanin o.l.) ☐
- Fugl ☐
- Andre dyr ☐
- Ingen dyr ☐

24. Bor **barnet** på gårdsbruk ? ☐ Ja ☐ Nei

Hvis ja, hvilke husdyr er det på gården ? (flere kryss)

- Kyr ☐
- Gris ☐
- Sau ☐
- Hest ☐
- Fjørfe ☐
- Andre husdyr ☐
- Ingen husdyr ☐

25. Hvilke energikilder brukes til oppvarming av boligen ? (flere kryss)

- Elektristitet ☐
- Vedfyring ☐
- Olje ☐
- Fjernvarme ☐
- Annet ☐

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26. Har, eller har boligen hatt noen av følgende problemer ?
(besvar alle spørsmål)

	Ja	Nei	**Hvis ja**, er problemet utbedret ? Ja, utbedret	Nei, ikke utbedret
Mugglukt eller kjellerlukt	☐	☐	☐	☐
Aviser og pappesker blir ved lagring 'fuktige'	☐	☐	☐	☐
Dugg på vinduer (utenom ved dusjing, fosskoking og sterk kulde)	☐	☐	☐	☐
Fuktflekker på vegg eller tak (fuktflekker som skyldes mindre søl med vann regnes ikke med her)	☐	☐	☐	☐
Vannlekkasjer fra sanitærinstallasjoner (rør, kraner, dusj, vask o.l.)	☐	☐	☐	☐
Vannlekkasjer fra yttertak	☐	☐	☐	☐
Vannlekkasjer fra grunnen/oversvømmelse	☐	☐	☐	☐
Blærer, bobler i eller misfarging av gulvbelegg	☐	☐	☐	☐
Ingen problemer	☐			

27. Hvilke av følgende ventilasjonsutstyr er installert i boligen ?

	Ja	Nei
A. Egen avtrekksvifte over komfyr	☐	☐
B. Egen avtrekksvifte i ventil i yttervegg på våtrom	☐	☐
C. Ventiler i yttervegg/vinduskarm eller luftevindu	☐	☐
D. Sentral avtrekksventilasjon (sentral vifte som gir avtrekk fra bad, toalett og kjøkken)	☐	☐
E. Ventilasjonsanlegg (sentral vifte som gir avtrekk fra bad, toalett og kjøkken, og en sentral vifte som gir tilførsel av luft til oppholdsrom og soverom)	☐	☐

Hvis ja på D eller E - Omtrent hvor mange **timer per døgn** er det for tiden i bruk : ☐☐ Skriv 0 hvis ikke i bruk

- Omtrent hvor mange **ganger per år** skiftes filter : ☐☐ Skriv 0 hvis ingen

28. Hvor ofte gjennomluftes boligen for tiden ved å åpne vindu eller dører i minimum 3-5 minutter ?
(ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang om dagen ☐
- 1 gang om dagen ☐
- 2 ganger daglig ☐
- 3 eller flere ganger daglig ☐

29. Hvilke av følgende aktiviteter foregår **daglig i boligen uten** at elektrisk avtrekksvifte/ ventilasjon benyttes ? (flere kryss)

- Tørking av tøy ☐
- Koking av mat ☐
- Bruk av tørkeskap/tørketrommel ☐
- Dusjing (mer enn 5 minutter) ☐
- Bruk av luftfukter ☐
- Ingen aktiviteter ☐

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30. I hvilken etasje av bygningen er **barnets** soverom ? (ett kryss)

Sokkel	☐
Kjeller	☐
1. etasje	☐
2. etasje eller høyere	☐

31. Sover **barnet** for tiden med åpent vindu ?

☐ Ja ☐ Nei

32. Hva slags dyne eller pute bruker **barnet** nå ?

	Dyne	Pute
Syntetiske fibre	☐	☐
Dun	☐	☐
Annet	☐	☐
Bruker ikke dyne eller pute	☐	☐

33. Hvor gammel er **barnets** nåværende dyne, pute og madrass ?

	Alder, (under 1 år skriv 0)
Dyne	☐☐ år
Pute	☐☐ år
Madrass	☐☐ år

34. Hvor ofte vaskes sengetøyet til **barnet** ? ☐☐ ganger per måned

Hvor ofte rengjøres madrassen til **barnet** ? ☐☐ ganger per **år**

35. Tørkes sengetøyet i tørketrommel ?

☐ Ja ☐ Nei

36. Hvor mange våtrom og andre rom har **vinylgulv med gulvvarme** ? (Skriv 0 hvis ingen)

Våtrom (bad, vaskerom, WC)	☐ antall rom
Andre rom	☐ antall rom

37. Hvilke materialer er brukt **på gulv** i soverommet, og i oppholdsrommet **barnet** bruker mest ? (flere kryss)

	Gulv i barnets soverom	Gulv i barnets mest brukte oppholdsrom
Heldekkende tepper	☐	☐
Vinyl (PVC-plast)	☐	☐
Furu tregulv	☐	☐
Parkett/andre harde materialer	☐	☐
Annet	☐	☐

38. Hvilke overflater har **veggene i** soverommet og i oppholdsrommet **barnet** bruker mest ?

(flere kryss)	Vegg i barnets soverom	Vegg i barnets mest brukte oppholdsrom
Ubehandlet/lutet trepanel	☐	☐
Malt/lakkert trepanel	☐	☐
Annen malt/lakkert overflate	☐	☐
Annen overflate	☐	☐

39. Har det blitt gjort noen av følgende endringer i boligen **siste 12 måneder** ?

	Ja	Nei
Nytt furu trepanel eller furu gulv	☐	☐
Nytt vinyl gulv (PVC-plast)	☐	☐
Liming av tapet, strie, gulvbelegg etc.	☐	☐
Maling, lakkering	☐	☐
Andre endringer	☐	☐

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Spørsmål om kosthold

I svangerskapet og i ammeperioden

40. Hvor ofte i gjennomsnitt spiste mor torsk, sei eller annen mager fisk til middag ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjeldnere enn 1 gang i uken	☐	☐
1 gang i uken	☐	☐
2 ganger i uken	☐	☐
3 ganger i uken	☐	☐
4 ganger i uken eller oftere	☐	☐

41. Hvor ofte i gjennomsnitt spiste mor uer, kveite, laks, ørret, sild, makrell eller annen fet fisk til middag ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjeldnere enn 1 gang i uken	☐	☐
1 gang i uken	☐	☐
2 ganger i uken	☐	☐
3 ganger i uken	☐	☐
4 ganger i uken eller oftere	☐	☐

42. Hvor ofte i gjennomsnitt tok mor tran eller fiskeoljekapsler ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjeldnere enn 1 gang i uken	☐	☐
1 gang i uken	☐	☐
2 ganger i uken	☐	☐
3 ganger i uken	☐	☐
4 ganger i uken eller oftere	☐	☐

43. Hvor mange brødskiver i gjennomsnitt spiste mor der pålegget bestod av fet fisk (sild, sardiner, makrell, laks ol.) ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Mindre enn 1 skive i uken	☐	☐
1-2 skiver i uken	☐	☐
3-6 skiver i uken	☐	☐
1-2 skiver i daglig	☐	☐
3-4 skiver i daglig	☐	☐
5 eller flere skiver i daglig	☐	☐

44. Hvor ofte spiste mor i gjennomsnitt grønnsaker til middag eller som egen rett (her menes rå eller kokte grønnsaker) ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjelden	☐	☐
Omtrent 1 gang i uken	☐	☐
2-3 ganger i uken	☐	☐
4-5 ganger i uken	☐	☐
Omtrent daglig	☐	☐

45. Hva slags type fett ble brukt til matlaging (ikke på brødet) i mors husholdning ?

(flere kryss)

	I svanger-skapet	I amme-perioden
Meierismør	☐	☐
Hard margarin	☐	☐
Bløt (soft) margarin	☐	☐
Smør/margarin blanding	☐	☐
Soyaolje	☐	☐
Olivenolje	☐	☐

46. Har mor i ammeperioden spist noen av følgende matemner ?

	Ofte (minst ukentlig)	Av og til (noen ganger i måneden)	En gang	Aldri
Kumelk	☐	☐	☐	☐
Egg	☐	☐	☐	☐
Fisk	☐	☐	☐	☐
Skalldyr	☐	☐	☐	☐
Nøtter	☐	☐	☐	☐
Erter/belgfrukter	☐	☐	☐	☐

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Spørsmål om barnets ernæring

47. Har barnet fått morsmelk ?
☐ Ja ☐ Nei

48. Får barnet morsmelk fremdeles ?
☐ Ja ☐ Nei
Hvis nei, hvor gammelt var barnet da det sluttet med morsmelk ?
☐☐ måneder

49. Får barnet tran ?
☐ Ja ☐ Nei

50. Får barnet annet vitamintilskudd ?
(for eksempel Biovit, Sanasol)
☐ Ja ☐ Nei

51. Får barnet morsmelkerstatning ?
☐ Ja ☐ Nei

Hvis ja, hvilken type **?**
Collett ☐
NAN ☐
Nutramigen ☐
Soyamelk ☐
Annet ☐

Hvis ja, hvor gammelt var barnet da det startet med morsmelkerstatning ?
☐☐ måneder

Spørsmål om røykevaner

52. Røykte du eller ektefelle/ samboer ved svangerskapets start ?

	Nei, røykte ikke	Ja, røykte ukentlig	Ja, røykte daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

53. Røyker du eller ektefelle/ samboer nå ?

	Nei, røyker ikke	Ja, røyker ukentlig	Ja, røyker daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

54. Røykes det **innendørs** hjemme ?

Nei, det røykes ikke innendørs	Ja, det røykes ukentlig innendørs	Ja, det røykes daglig innendørs
☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

Appendix 3

Questionnaire Q3:
Questions on risk factors and behaviour 1 year after birth in Norwegian

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Barneallergistudien i Trondheim

Spørreskjema om livsstilsfaktorer ved 1 års alder

Skriv tydelige tall og kryss. Bruk **svart** eller **blå** penn.

Utfyllt dato (dd.mm.åå) ☐☐.☐☐.☐☐

Spørsmål om barnet

1. Er barnet tvilling ? ☐ Ja ☐ Nei **Hvis tvilling**, svar på alle spørsmålene for tvilling I, deretter svar på spørsmål 1-6 og 47-57 for tvilling II på eget skjema.

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2. Barnets fødselsvekt ? ☐☐☐☐ gram og fødselslengde ? ☐☐ cm

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3. Hvor mange søsken har barnet ?
(ta med fellesbarn og særkullsbarn, **ikke** fosterbarn og adoptivbarn)

Ingen søsken : ☐ (kryss)
Antall søsken : ☐ brødre ☐ søstre

---

4. Når ble barnet født i forhold til beregnet ultralydtermin ? (ett kryss)

Tidligere enn 2 uker før beregnet ultralydtermin ☐
Mellom 3 uker før og 2 uker etter beregnet ultralydtermin ☐
Senere enn 2 uker etter beregnet ultralydtermin ☐

---

5. Har barnet blitt vaksinert ? ☐ Ja ☐ Nei

---

6. Har barnet hatt noen av sykdommene nedenfor ?

	Ja	Nei	Hvis ja, antall ganger	Er noen av sykdommene behandlet med penicillin/antibiotika ? Ja	Nei	Vet ikke	Hvis ja, hvor mange behandlinger
Forkjølelse	☐	☐	☐	☐	☐	☐	☐
Ørebetennelse	☐	☐	☐	☐	☐	☐	☐
Bronkitt	☐	☐	☐	☐	☐	☐	☐
RS-virusinfeksjon	☐	☐	☐	☐	☐	☐	☐
Falsk krupp	☐	☐	☐	☐	☐	☐	☐
Lungebetennelse	☐	☐	☐	☐	☐	☐	☐
Urinveisinfeksjon	☐	☐	☐	☐	☐	☐	☐
Mage-tarminfeksjon	☐	☐	☐	☐	☐	☐	☐

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7. Foreldrenes sivilstatus: ☐ Gift ☐ Samboer ☐ Enslig ☐ Annet

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Spørsmål om foreldre og søsken

8. Har mor, far eller noen av barna **noen gang** hatt astma, eksem eller allergi i øyne/nese ?

☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 14.
Hvis ja, kryss av for de familiemedlemmer det gjelder (flere kryss) :

	Astma	Eksem	Allergi i øyne/nese
Mor	☐	☐	☐
Far	☐	☐	☐
Fellesbarn	☐	☐	☐
Dine særkullsbarn	☐	☐	☐
Barnefarens særkullsbarn	☐	☐	☐

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9. Har, eller har mor, far eller fellesbarn **noen gang** hatt astmasykdom ? ☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 11.
Hvis ja, angi alder i dag, når astmasykdommen startet, om sykdommen fortsatt er til stede, og når den eventuelt sluttet.

	Alder i dag	Startalder astma	Har fortsatt astma (kryss)	Sluttalder astma
Mor	☐☐ år	☐☐ år	☐	☐☐ år
Far	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 1	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 2	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 3	☐☐ år	☐☐ år	☐	☐☐ år

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10. Har, eller har mor, far eller fellesbarn hatt astmaplager eller brukt astmamedisiner de **siste 12 måneder** ?

☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av astmaplager siste 12 måneder				Brukt astmamedisin siste 12 måneder	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

---

11. Har, eller har mor,far eller fellesbarn hatt eksemplager, eller brukt eksemmedisin de **siste 12 måneder** ?

☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av eksemplager siste 12 måneder				Brukt eksemmedisin siste 12 måneder ?	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

12. Har, eller har mor, far eller fellesbarn hatt allergi i øyne/nese, eller brukt allergimedisiner ?

☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 14.
Hvis ja, kryss av (flere kryss) for de det gjelder :

	Allergi mot				Brukt allergimedisin siste 12 måneder ?	
	Pollen	Dyrehår	Husstøv/ midd	Andre	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

---

13. Hvis mor, far eller fellesbarn har allergi i øyne/nese, hvordan er det påvist ?
Kryss av for de det gjelder :

	Allergi påvist ved blodprøve ?			Allergi påvist ved prikk(hud)-testing ?		
	Ja	Nei	Vet ikke	Ja	Nei	Vet ikke
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

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14. Kryss av om mor hadde noen av følgende plager i siste svangerskap. Oppgi i hvilken periode, og om mulig navn på medisiner som ble brukt.

	Plager i siste svangerskap ?	Periode i svangerskapet (flere kryss) 0-3 mnd	4-6 mnd	7-9 mnd	Medisinnavn
Svangerskapsblødning	☐	☐	☐	☐	_____
Svangerskapsforgiftning	☐	☐	☐	☐	_____
Forhøyet blodtrykk	☐	☐	☐	☐	_____
Svangerskapsdiabetes	☐	☐	☐	☐	_____
Diabetes, insulinbehandlet	☐	☐	☐	☐	_____
Diabetes, tablettbehandlet	☐	☐	☐	☐	_____
Soppinfeksjon i skjeden	☐	☐	☐	☐	_____
Skjedekatarr/uvanlig utflod	☐	☐	☐	☐	_____
Forkjølelse	☐	☐	☐	☐	_____
Influensa	☐	☐	☐	☐	_____
Bronkitt	☐	☐	☐	☐	_____
Lungebetennelse	☐	☐	☐	☐	_____
Astma	☐	☐	☐	☐	_____
Eksem	☐	☐	☐	☐	_____
Allergi i øyne /nese	☐	☐	☐	☐	_____
Andre plager	☐				
Ingen plager	☐				

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Spørsmål om bolig / innemiljø nå

15. I hvilken type bolig bor **barnet** ? (ett kryss)

- Enebolig/våningshus uten sokkel/kjeller ☐
- Enebolig/våningshus med sokkel/kjeller ☐
- Sokkelleilighet i enebolig ☐
- Tomannsbolig, firemannsbolig ☐
- Rekkehus/kjedehus ☐
- Terrassehus ☐
- Boligblokk/bygård ☐
- Annen bolig ☐

16. Boligens byggeår ? (årstall) ☐☐☐☐

Hvor lenge har barnet bodd i boligen ? ☐ år ☐☐ måneder

17. Eier du/dere boligen ?

- Ja, som selveiere ☐
- Ja, i borettslag ☐
- Nei ☐

18. Boligens boareal (cirka) ? ☐☐☐ m^2

19. Hvor mange personer bor det for tiden i boligen ? ☐☐

20. Hvor ofte vaskes boligen ? ☐☐ ganger per måned

Hvor ofte støvsuges boligen ? ☐☐ ganger per måned

21. Har boligen sentralstøvsuger ? ☐ Ja ☐ Nei

22. Hvor mange timer oppholder **barnet** seg i gjennomsnitt i boligen ?

I boligen ☐☐ timer per døgn

I eget soverom ☐☐ timer per døgn

23. Hvilke av følgende husdyr oppholder seg i boligen ? (flere kryss)

- Hund ☐
- Katt ☐
- Andre pelsdyr (marsvin, kanin o.l.) ☐
- Fugl ☐
- Andre dyr ☐
- Ingen dyr ☐

24. Bor **barnet** på gårdsbruk ☐ Ja ☐ Nei

Hvis ja, hvilke husdyr er det på gården ? (flere kryss)

- Kyr ☐
- Gris ☐
- Sau ☐
- Hest ☐
- Fjørfe ☐
- Andre husdyr ☐
- Ingen husdyr ☐

25. Hvilke energikilder brukes til oppvarming av boligen ? (flere kryss)

- Elektristitet ☐
- Vedfyring ☐
- Olje ☐
- Fjernvarme ☐
- Annet ☐

26. Har, eller har boligen hatt noen av følgende problemer ?
(besvar alle spørsmål)

	Ja	Nei	**Hvis ja**, er problemet utbedret ? Ja, utbedret	Nei, ikke utbedret
Mugglukt eller kjellerlukt	☐	☐	☐	☐
Aviser og pappesker blir ved lagring 'fuktige'	☐	☐	☐	☐
Dugg på vinduer (utenom ved dusjing, fosskoking og sterk kulde)	☐	☐	☐	☐
Fuktflekker på vegg eller tak (fuktflekker som skyldes mindre søl med vann regnes ikke med her)	☐	☐	☐	☐
Vannlekkasjer fra sanitærinstallasjoner (rør, kraner, dusj, vask o.l.)	☐	☐	☐	☐
Vannlekkasjer fra yttertak	☐	☐	☐	☐
Vannlekkasjer fra grunnen/oversvømmelse	☐	☐	☐	☐
Blærer, bobler i eller misfarging av gulvbelegg	☐	☐	☐	☐
Ingen problemer	☐			

27. Hvilke av følgende ventilasjonsutstyr er installert i boligen ?

	Ja	Nei
A. Egen avtrekksvifte over komfyr	☐	☐
B. Egen avtrekksvifte i ventil i yttervegg på våtrom	☐	☐
C. Ventiler i yttervegg/vinduskarm eller luftevindu	☐	☐
D. Sentral avtrekksventilasjon (sentral vifte som gir avtrekk fra bad, toalett og kjøkken)	☐	☐
E. Ventilasjonsanlegg (sentral vifte som gir avtrekk fra bad, toalett og kjøkken, og en sentral vifte som gir tilførsel av luft til oppholdsrom og soverom)	☐	☐

Hvis ja på D eller E - Omtrent hvor mange **timer per døgn** er det for tiden i bruk : ☐☐ Skriv 0 hvis ikke i bruk

- Omtrent hvor mange **ganger per år** skiftes filter : ☐☐ Skriv 0 hvis ingen

28. Hvor ofte gjennomluftes boligen for tiden ved å åpne vindu eller dører i minimum 3-5 minutter ?
(ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang om dagen ☐
- 1 gang om dagen ☐
- 2 ganger daglig ☐
- 3 eller flere ganger daglig ☐

29. Hvilke av følgende aktiviteter foregår **daglig i boligen uten** at elektrisk avtrekksvifte/ ventilasjon benyttes ? (flere kryss)

- Tørking av tøy ☐
- Koking av mat ☐
- Bruk av tørkeskap/tørketrommel ☐
- Dusjing (mer enn 5 minutter) ☐
- Bruk av luftfukter ☐
- Ingen aktiviteter ☐

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30. I hvilken etasje av bygningen er **barnets** soverom ? (ett kryss)

Sokkel	☐
Kjeller	☐
1. etasje	☐
2. etasje eller høyere	☐

31. Sover **barnet** for tiden med åpent vindu ?

☐ Ja ☐ Nei

32. Hva slags dyne eller pute bruker **barnet** nå ?

	Dyne	Pute
Syntetiske fibre	☐	☐
Dun	☐	☐
Annet	☐	☐
Bruker ikke dyne eller pute	☐	☐

33. Hvor gammel er **barnets** nåværende dyne, pute og madrass ?

	Alder, (under 1 år skriv 0)
Dyne	☐☐ år
Pute	☐☐ år
Madrass	☐☐ år

34. Hvor ofte vaskes sengetøyet til **barnet** ? ☐☐ ganger per måned

Hvor ofte rengjøres madrassen til **barnet** ? ☐☐ ganger per **år**

35. Tørkes sengetøyet i tørketrommel ?

☐ Ja ☐ Nei

36. Hvor mange våtrom og andre rom har **vinylgulv med gulvvarme** ? (Skriv 0 hvis ingen)

Våtrom (bad, vaskerom, WC)	☐ antall rom
Andre rom	☐ antall rom

37. Hvilke materialer er brukt **på gulv** i soverommet, og i oppholdsrommet **barnet** bruker mest ? (flere kryss)

	Gulv i barnets soverom	Gulv i barnets mest brukte oppholdsrom
Heldekkende tepper	☐	☐
Vinyl (PVC-plast)	☐	☐
Furu tregulv	☐	☐
Parkett/andre harde materialer	☐	☐
Annet	☐	☐

38. Hvilke overflater har **veggene i** soverommet og i oppholdsrommet **barnet** bruker mest ?

(flere kryss)	Vegg i barnets soverom	Vegg i barnets mest brukte oppholdsrom
Ubehandlet/lutet trepanel	☐	☐
Malt/lakkert trepanel	☐	☐
Annen malt/lakkert overflate	☐	☐
Annen overflate	☐	☐

39. Har det blitt gjort noen av følgende endringer i boligen **siste 12 måneder** ?

	Ja	Nei
Nytt furu trepanel eller furu gulv	☐	☐
Nytt vinyl gulv (PVC-plast)	☐	☐
Liming av tapet, strie, gulvbelegg etc.	☐	☐
Maling, lakkering	☐	☐
Andre endringer	☐	☐

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Spørsmål om kosthold

I svangerskapet og i ammeperioden

40. Hvor ofte i gjennomsnitt spiste mor torsk, sei eller annen mager fisk til middag ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjeldnere enn 1 gang i uken	☐	☐
1 gang i uken	☐	☐
2 ganger i uken	☐	☐
3 ganger i uken	☐	☐
4 ganger i uken eller oftere	☐	☐

41. Hvor ofte i gjennomsnitt spiste mor uer, kveite, laks, ørret, sild, makrell eller annen fet fisk til middag ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjeldnere enn 1 gang i uken	☐	☐
1 gang i uken	☐	☐
2 ganger i uken	☐	☐
3 ganger i uken	☐	☐
4 ganger i uken eller oftere	☐	☐

42. Hvor ofte i gjennomsnitt tok mor tran eller fiskeoljekapsler ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjeldnere enn 1 gang i uken	☐	☐
1 gang i uken	☐	☐
2 ganger i uken	☐	☐
3 ganger i uken	☐	☐
4 ganger i uken eller oftere	☐	☐

43. Hvor mange brødskiver i gjennomsnitt spiste mor der pålegget bestod av fet fisk (sild, sardiner, makrell, laks ol.) ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Mindre enn 1 skive i uken	☐	☐
1-2 skiver i uken	☐	☐
3-6 skiver i uken	☐	☐
1-2 skiver i daglig	☐	☐
3-4 skiver i daglig	☐	☐
5 eller flere skiver i daglig	☐	☐

44. Hvor ofte spiste mor i gjennomsnitt grønnsaker til middag eller som egen rett (her menes rå eller kokte grønnsaker) ?

	I svanger-skapet	I amme-perioden
Aldri	☐	☐
Sjelden	☐	☐
Omtrent 1 gang i uken	☐	☐
2-3 ganger i uken	☐	☐
4-5 ganger i uken	☐	☐
Omtrent daglig	☐	☐

45. Hva slags type fett ble brukt til matlaging (ikke på brødet) i mors husholdning ?

(flere kryss)

	I svanger-skapet	I amme-perioden
Meierismør	☐	☐
Hard margarin	☐	☐
Bløt (soft) margarin	☐	☐
Smør/margarin blanding	☐	☐
Soyaolje	☐	☐
Olivenolje	☐	☐

46. Har mor under ammeperioden spist noen av følgende matemner ?

	Ofte (minst ukentlig)	Av og til (noen ganger i måneden)	En gang	Aldri
Kumelk	☐	☐	☐	☐
Egg	☐	☐	☐	☐
Fisk	☐	☐	☐	☐
Skalldyr	☐	☐	☐	☐
Nøtter	☐	☐	☐	☐
Erter/belgfrukter	☐	☐	☐	☐

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Spørsmål om barnets ernæring

47. Har barnet fått morsmelk ?

☐ Ja ☐ Nei

Hvis ja, har barnet eventuelt sluttet med morsmelk ?

☐ Ja ☐ Nei

Hvis ja, hvor gammelt var barnet da det eventuelt sluttet med morsmelk ?

☐☐ måneder

48. Har barnet noen gang fått tran ?

☐ Ja ☐ Nei

Hvis ja, hvor gammelt var barnet da det fikk tran første gang ?

☐☐ måneder

Har barnet sluttet med tran ?

☐ Ja ☐ Nei

Hvis ja, hvor gammelt var barnet da det eventuelt sluttet med tran ?

☐☐ måneder

49. Får barnet annet vitamintilskudd ? (for eksempel Biovit, Sanasol)

☐ Ja ☐ Nei

50. Får barnet morsmelkerstatning ?

☐ Ja ☐ Nei

Hvis ja, hvilken type ?

- Collett ☐
- NA ☐
- Nutramigen ☐
- Soyamelk ☐
- Annet ☐

Hvis ja, hvor gammelt var barnet da det startet med morsmelkerstatning ?

☐☐ måneder

51. Hvor gammelt var barnet da det startet med følgende matslag ?

	Alder i måneder	(kryss) Ikke fått
Risgrøt	☐☐	☐
Maisgrøt	☐☐	☐
Hvetegrøt	☐☐	☐
Brødskive	☐☐	☐
Kokte grønnsaker	☐☐	☐
Rå grønnsaker	☐☐	☐
Frukt	☐☐	☐
Middagsmat på glass	☐☐	☐
Middagsmat hjemmelaget	☐☐	☐
Fisk	☐☐	☐
Melk	☐☐	☐
Egg	☐☐	☐

52. Hvor ofte i gjennomsnitt spiser barnet torsk, sei eller annen mager fisk til middag ? (ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang i uken ☐
- 1 gang i uken ☐
- 2 ganger i uken ☐
- 3 ganger i uken ☐
- 4 ganger i uken eller oftere ☐

53. Hvor ofte i gjennomsnitt spiser barnet uer, kveite, laks, ørret, sild, makrell eller annen fet fisk til middag ? (ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang i uken ☐
- 1 gang i uken ☐
- 2 ganger i uken ☐
- 3 ganger i uken ☐
- 4 ganger i uken eller oftere ☐

54. Hvor ofte i gjennomsnitt tar barnet tran eller fiskeoljekapsler ? (ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang i uken ☐
- 1 gang i uken ☐
- 2 ganger i uken ☐
- 3 ganger i uken ☐
- 4 ganger i uken eller oftere ☐

55. Hvor mange brødskiver i gjennomsnitt spiser barnet der pålegget består av fet fisk (sild, sardiner, makrell, laks ol.) ? (ett kryss)

- Aldri ☐
- Mindre enn 1 skive i uken ☐
- 1-2 skiver i uken ☐
- 3-6 skiver i uken ☐
- 1-2 skiver daglig ☐
- 3-4 skiver daglig ☐
- 5 eller flere skiver daglig ☐

56. Hvor ofte spiser barnet i gjennomsnitt grønnsaker til middag eller som egen rett ?

	Rå grønnsaker	Kokte grønnsaker
Aldri	☐	☐
Sjelden	☐	☐
Omtrent 1 gang i uken	☐	☐
2-3 ganger i uken	☐	☐
4-5 ganger i uken	☐	☐
Omtrent daglig	☐	☐

57. Hva slags type fett brukes til matlaging i din husholdning og på brødet til barnet ? (flere kryss)

	I husholdningen	På brødet til barnet
Meierismør	☐	☐
Hard margarin	☐	☐
Bløt (soft) margarin	☐	☐
Smør/margarin blanding	☐	☐
Soyaolje	☐	☐
Olivenolje	☐	☐

Spørsmål om røykevaner

58. Røykte du eller ektefelle/samboer ved svangerskapets start ?

	Nei, røykte ikke	Ja, røykte ukentlig	Ja, røykte daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

59. Røyker du eller ektefelle/samboer nå ?

	Nei, røyker ikke	Ja, røyker ukentlig	Ja, røyker daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

60. Røykes det **innendørs** hjemme ?

Nei, det røykes ikke innendørs	Ja, det røykes ukentlig innendørs	Ja, det røykes daglig innendørs
☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

61. Ble det røykt innendørs hjemme etter barnets første leveår ?

Nei, det ble ikke røykt innendørs	Ja, det røykes ukentlig innendørs	Ja, det røykes daglig innendørs
☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

Appendix 4

Questionnaire Q4a:
Questions on risk factors and behaviour 2 years after birth in Norwegian

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Barneallergistudien i Trondheim

Spørreskjema om livsstilsfaktorer ved 2 års alder

Skriv tydelige tall og kryss. Bruk **svart** eller **blå** penn.

Utfylt dato (dd.mm.åå) ☐☐.☐☐.☐☐

Spørsmål om barnet

1. Er barnet tvilling ? ☐ Ja ☐ Nei **Hvis tvilling**, svar på alle spørsmålene for tvilling I, deretter svar på spørsmål 1-6 og 40-50 for tvilling II på eget skjema.

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2. Barnets fødselsvekt ? ☐☐☐☐ gram og fødselslengde ? ☐☐ cm

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3. Hvor mange søsken har barnet ?
(ta med fellesbarn og særkullsbarn, **ikke** fosterbarn og adoptivbarn)

Ingen søsken : ☐ (kryss)
Antall søsken : ☐ brødre ☐ søstre

---

4. Når ble barnet født i forhold til beregnet ultralydtermin ? (ett kryss)

Tidligere enn 2 uker før beregnet ultralydtermin ☐
Mellom 3 uker før og 2 uker etter beregnet ultralydtermin ☐
Senere enn 2 uker etter beregnet ultralydtermin ☐

---

5. Har barnet blitt vaksinert ? ☐ Ja ☐ Nei

---

6. Har barnet hatt noen av sykdommene nedenfor ?

	Ja	Nei	Hvis ja, antall ganger	Er noen av sykdommene behandlet med penicillin/antibiotika ? Ja	Nei	Vet ikke	Hvis ja, hvor mange behandlinger
Forkjølelse	☐	☐	☐☐	☐	☐	☐	☐☐
Ørebetennelse	☐	☐	☐☐	☐	☐	☐	☐☐
Bronkitt	☐	☐	☐☐	☐	☐	☐	☐☐
RS-virusinfeksjon	☐	☐	☐☐	☐	☐	☐	☐☐
Falsk krupp	☐	☐	☐☐	☐	☐	☐	☐☐
Lungebetennelse	☐	☐	☐☐	☐	☐	☐	☐☐
Urinveisinfeksjon	☐	☐	☐☐	☐	☐	☐	☐☐
Mage-tarminfeksjon	☐	☐	☐☐	☐	☐	☐	☐☐

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7. Foreldrenes sivilstatus: ☐ Gift ☐ Samboer ☐ Enslig ☐ Annet

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Spørsmål om foreldre og søsken

8. Har mor, far eller noen av barna **noen gang** hatt astma, eksem eller allergi i øyne/nese ?

☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 14.
Hvis ja, kryss av for de familiemedlemmer det gjelder (flere kryss) :

	Astma	Eksem	Allergi i øyne/nese
Mor	☐	☐	☐
Far	☐	☐	☐
Fellesbarn	☐	☐	☐
Dine særkullsbarn	☐	☐	☐
Barnefarens særkullsbarn	☐	☐	☐

---

9. Har, eller har mor, far eller fellesbarn **noen gang** hatt astmasykdom ? ☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 11.
Hvis ja, angi alder i dag, når astmasykdommen startet, om sykdommen fortsatt er til stede, og når den eventuelt sluttet.

	Alder i dag	Startalder astma	Har fortsatt astma (kryss)	Sluttalder astma
Mor	☐☐ år	☐☐ år	☐	☐☐ år
Far	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 1	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 2	☐☐ år	☐☐ år	☐	☐☐ år
Fellesbarn 3	☐☐ år	☐☐ år	☐	☐☐ år

---

10. Har, eller har mor, far eller fellesbarn hatt astmaplager eller brukt astmamedisiner de **siste 12 måneder** ?

☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av astmaplager siste 12 måneder				Brukt astmamedisin siste 12 måneder	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

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11. Har, eller har mor,far eller fellesbarn hatt eksemplager, eller brukt eksemmedisin de **siste 12 måneder** ?

☐ Ja ☐ Nei

Hvis ja, kryss av for de det gjelder :

	Hyppighet av eksemplager siste 12 måneder				Brukt eksemmedisin siste 12 måneder ?	
	Daglig	Ukentlig	Månedlig	Sjeldnere enn månedlig	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

12. Har, eller har mor, far eller fellesbarn hatt allergi i øyne/nese, eller brukt allergimedisiner ?

☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 14.
Hvis ja, kryss av (flere kryss) for de det gjelder :

	Allergi mot				Brukt allergimedisin siste 12 måneder ?	
	Pollen	Dyrehår	Husstøv/ midd	Andre	Ja	Nei
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

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13. Hvis mor, far eller fellesbarn har allergi i øyne/nese, hvordan er det påvist ?
Kryss av for de det gjelder :

	Allergi påvist ved blodprøve ?			Allergi påvist ved prikk(hud)-testing ?		
	Ja	Nei	Vet ikke	Ja	Nei	Vet ikke
Mor	☐	☐	☐	☐	☐	☐
Far	☐	☐	☐	☐	☐	☐
Fellesbarn 1	☐	☐	☐	☐	☐	☐
Fellesbarn 2	☐	☐	☐	☐	☐	☐
Fellesbarn 3	☐	☐	☐	☐	☐	☐

---

14. Kryss av om mor hadde noen av følgende plager i siste svangerskap. Oppgi i hvilken periode, og om mulig navn på medisiner som ble brukt.

	Plager i siste svangerskap ?	Periode i svangerskapet (flere kryss) 0-3 mnd	4-6 mnd	7-9 mnd	Medisinnavn
Svangerskapsblødning	☐	☐	☐	☐	_____
Svangerskapsforgiftning	☐	☐	☐	☐	_____
Forhøyet blodtrykk	☐	☐	☐	☐	_____
Svangerskapsdiabetes	☐	☐	☐	☐	_____
Diabetes, insulinbehandlet	☐	☐	☐	☐	_____
Diabetes, tablettbehandlet	☐	☐	☐	☐	_____
Soppinfeksjon i skjeden	☐	☐	☐	☐	_____
Skjedekatarr/uvanlig utflod	☐	☐	☐	☐	_____
Forkjølelse	☐	☐	☐	☐	_____
Influensa	☐	☐	☐	☐	_____
Bronkitt	☐	☐	☐	☐	_____
Lungebetennelse	☐	☐	☐	☐	_____
Astma	☐	☐	☐	☐	_____
Eksem	☐	☐	☐	☐	_____
Allergi i øyne /nese	☐	☐	☐	☐	_____
Andre plager	☐				
Ingen plager	☐				

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Spørsmål om bolig / innemiljø nå

15. I hvilken type bolig bor **barnet** ? (ett kryss)

- Enebolig/våningshus uten sokkel/kjeller ☐
- Enebolig/våningshus med sokkel/kjeller ☐
- Sokkelleilighet i enebolig ☐
- Tomannsbolig, firemannsbolig ☐
- Rekkehus/kjedehus ☐
- Terrassehus ☐
- Boligblokk/bygård ☐
- Annen bolig ☐

16. Boligens byggeår ? (årstall) ☐☐☐☐

Hvor lenge har barnet bodd i boligen ? ☐ år ☐☐ måneder

17. Eier du/dere boligen ?

- Ja, som selveiere ☐
- Ja, i borettslag ☐
- Nei ☐

18. Boligens boareal (cirka) ? ☐☐☐ m^2

19. Hvor mange personer bor det for tiden i boligen ? ☐☐

20. Hvor ofte vaskes boligen ? ☐☐ ganger per måned

Hvor ofte støvsuges boligen ? ☐☐ ganger per måned

21. Har boligen sentralstøvsuger ? ☐ Ja ☐ Nei

22. Hvor mange timer oppholder **barnet** seg i gjennomsnitt i boligen ?

I boligen ☐☐ timer per døgn

I eget soverom ☐☐ timer per døgn

23. Hvilke av følgende husdyr oppholder seg i boligen ? (flere kryss)

- Hund ☐
- Katt ☐
- Andre pelsdyr (marsvin, kanin o.l.) ☐
- Fugl ☐
- Andre dyr ☐
- Ingen dyr ☐

24. Bor **barnet** på gårdsbruk ☐ Ja ☐ Nei

Hvis ja, hvilke husdyr er det på gården ? (flere kryss)

- Kyr ☐
- Gris ☐
- Sau ☐
- Hest ☐
- Fjørfe ☐
- Andre husdyr ☐
- Ingen husdyr ☐

25. Hvilke energikilder brukes til oppvarming av boligen ? (flere kryss)

- Elektristitet ☐
- Vedfyring ☐
- Olje ☐
- Fjernvarme ☐
- Annet ☐

26. Har, eller har boligen hatt noen av følgende problemer ?
(besvar alle spørsmål)

	Ja	Nei	**Hvis ja**, er problemet utbedret ? Ja, utbedret	Nei, ikke utbedret
Mugglukt eller kjellerlukt	☐	☐	☐	☐
Aviser og pappesker blir ved lagring 'fuktige'	☐	☐	☐	☐
Dugg på vinduer (utenom ved dusjing, fosskoking og sterk kulde)	☐	☐	☐	☐
Fuktflekker på vegg eller tak (fuktflekker som skyldes mindre søl med vann regnes ikke med her)	☐	☐	☐	☐
Vannlekkasjer fra sanitærinstallasjoner (rør, kraner, dusj, vask o.l.)	☐	☐	☐	☐
Vannlekkasjer fra yttertak	☐	☐	☐	☐
Vannlekkasjer fra grunnen/oversvømmelse	☐	☐	☐	☐
Blærer, bobler i eller misfarging av gulvbelegg	☐	☐	☐	☐
Ingen problemer	☐			

27. Hvilke av følgende ventilasjonsutstyr er installert i boligen ?

	Ja	Nei
A. Egen avtrekksvifte over komfyr	☐	☐
B. Egen avtrekksvifte i ventil i yttervegg på våtrom	☐	☐
C. Ventiler i yttervegg/vinduskarm eller luftevindu	☐	☐
D. Sentral avtrekksventilasjon (sentral vifte som gir avtrekk fra bad, toalett og kjøkken)	☐	☐
E. Ventilasjonsanlegg (sentral vifte som gir avtrekk fra bad, toalett og kjøkken, og en sentral vifte som gir tilførsel av luft til oppholdsrom og soverom)	☐	☐

Hvis ja på D eller E - Omtrent hvor mange **timer per døgn** er det for tiden i bruk : ☐☐ Skriv 0 hvis ikke i bruk

- Omtrent hvor mange **ganger per år** skiftes filter : ☐☐ Skriv 0 hvis ingen

28. Hvor ofte gjennomluftes boligen for tiden ved å åpne vindu eller dører i minimum 3-5 minutter ?
(ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang om dagen ☐
- 1 gang om dagen ☐
- 2 ganger daglig ☐
- 3 eller flere ganger daglig ☐

29. Hvilke av følgende aktiviteter foregår **daglig i boligen uten** at elektrisk avtrekksvifte/ ventilasjon benyttes ? (flere kryss)

- Tørking av tøy ☐
- Koking av mat ☐
- Bruk av tørkeskap/tørketrommel ☐
- Dusjing (mer enn 5 minutter) ☐
- Bruk av luftfukter ☐
- Ingen aktiviteter ☐

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30. I hvilken etasje av bygningen er **barnets** soverom ? (ett kryss)

Sokkel	☐
Kjeller	☐
1. etasje	☐
2. etasje eller høyere	☐

31. Sover **barnet** for tiden med åpent vindu ?

☐ Ja ☐ Nei

32. Hva slags dyne eller pute bruker **barnet** nå ?

	Dyne	Pute
Syntetiske fibre	☐	☐
Dun	☐	☐
Annet	☐	☐
Bruker ikke dyne eller pute	☐	☐

33. Hvor gammel er **barnets** nåværende dyne, pute og madrass ?

	Alder, (under 1 år skriv 0)
Dyne	☐☐ år
Pute	☐☐ år
Madrass	☐☐ år

34. Hvor ofte vaskes sengetøyet til **barnet** ? ☐☐ ganger per måned

Hvor ofte rengjøres madrassen til **barnet** ? ☐☐ ganger per **år**

35. Tørkes sengetøyet i tørketrommel ?

☐ Ja ☐ Nei

36. Hvor mange våtrom og andre rom har **vinylgulv med gulvvarme** ? (Skriv 0 hvis ingen)

Våtrom (bad, vaskerom, WC)	☐ antall rom
Andre rom	☐ antall rom

37. Hvilke materialer er brukt **på gulv** i soverommet, og i oppholdsrommet **barnet** bruker mest ? (flere kryss)

	Gulv i barnets soverom	Gulv i barnets mest brukte oppholdsrom
Heldekkende tepper	☐	☐
Vinyl (PVC-plast)	☐	☐
Furu tregulv	☐	☐
Parkett/andre harde materialer	☐	☐
Annet	☐	☐

38. Hvilke overflater har **veggene i** soverommet og i oppholdsrommet **barnet** bruker mest ?

(flere kryss)	Vegg i barnets soverom	Vegg i barnets mest brukte oppholdsrom
Ubehandlet/lutet trepanel	☐	☐
Malt/lakkert trepanel	☐	☐
Annen malt/lakkert overflate	☐	☐
Annen overflate	☐	☐

39. Har det blitt gjort noen av følgende endringer i boligen **siste 12 måneder** ?

	Ja	Nei
Nytt furu trepanel eller furu gulv	☐	☐
Nytt vinyl gulv (PVC-plast)	☐	☐
Liming av tapet, strie, gulvbelegg etc.	☐	☐
Maling, lakkering	☐	☐
Andre endringer	☐	☐

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Spørsmål om barnets ernæring

40. Har barnet fått morsmelk ?

☐ Ja ☐ Nei

Hvis ja, har barnet eventuelt sluttet med morsmelk ?

☐ Ja ☐ Nei

Hvis ja, hvor gammelt var barnet da det eventuelt sluttet med morsmelk ?

☐☐ år ☐☐ måneder

41. Har barnet noen gang fått tran ?

☐ Ja ☐ Nei

Hvis ja, hvor gammelt var barnet da det fikk tran første gang ?

☐☐ år ☐☐ måneder

Har barnet sluttet med tran ?

☐ Ja ☐ Nei

Hvis ja, hvor gammelt var barnet da det eventuelt sluttet med tran ?

☐☐ år ☐☐ måneder

42. Får barnet annet vitamintilskudd ? (for eksempel Biovit, Sanasol)

☐ Ja ☐ Nei

43. Har barnet fått morsmelkerstatning ?

☐ Ja ☐ Nei

Hvis ja, hvilken type ?

- Collett ☐
- NA ☐
- Nutramigen ☐
- Soyamelk ☐
- Annet ☐

Hvis ja, hvor gammelt var barnet da det startet med morsmelkerstatning ?

☐☐ måneder

44. Hvor gammelt var barnet da det startet med følgende matslag ?

	Alder i måneder	(kryss) Ikke fått
Kokte grønnsaker	☐☐	☐
Rå grønnsaker	☐☐	☐
Frukt	☐☐	☐
Fisk	☐☐	☐
Melk	☐☐	☐
Egg	☐☐	☐

45. Hvor ofte i gjennomsnitt spiser barnet torsk, sei eller annen mager fisk til middag ? (ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang i uken ☐
- 1 gang i uken ☐
- 2 ganger i uken ☐
- 3 ganger i uken ☐
- 4 ganger i uken eller oftere ☐

46. Hvor ofte i gjennomsnitt spiser barnet uer, kveite, laks, ørret, sild, makrell eller annen fet fisk til middag ? (ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang i uken ☐
- 1 gang i uken ☐
- 2 ganger i uken ☐
- 3 ganger i uken ☐
- 4 ganger i uken eller oftere ☐

47. Hvor ofte i gjennomsnitt tar barnet tran eller fiskeoljekapsler ? (ett kryss)

- Aldri ☐
- Sjeldnere enn 1 gang i uken ☐
- 1 gang i uken ☐
- 2 ganger i uken ☐
- 3 ganger i uken ☐
- 4 ganger i uken eller oftere ☐

48. Hvor mange brødskiver i gjennomsnitt spiser barnet der pålegget består av fet fisk (sild, sardiner, makrell, laks ol.) ? (ett kryss)

- Aldri ☐
- Mindre enn 1 skive i uken ☐
- 1-2 skiver i uken ☐
- 3-6 skiver i uken ☐
- 1-2 skiver daglig ☐
- 3-4 skiver daglig ☐
- 5 eller flere skiver daglig ☐

49 Hvor ofte spiser barnet i gjennomsnitt grønnsaker til middag eller som egen rett ?

	Rå grønnsaker	Kokte grønnsaker
Aldri	☐	☐
Sjelden	☐	☐
Omtrent 1 gang i uken	☐	☐
2-3 ganger i uken	☐	☐
4-5 ganger i uken	☐	☐
Omtrent daglig	☐	☐

50. Hva slags type fett brukes til matlaging i din husholdning og på brødet til barnet ? (flere kryss)

	I husholdningen	På brødet til barnet
Meierismør	☐	☐
Hard margarin	☐	☐
Bløt (soft) margarin	☐	☐
Smør/margarin blanding	☐	☐
Soyaolje	☐	☐
Olivenolje	☐	☐

Spørsmål om røykevaner

51. Røykte du eller ektefelle/ samboer ved svangerskapets start ?

	Nei, røykte ikke	Ja, røykte ukentlig	Ja, røykte daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

52. Røyker du eller ektefelle/ samboer nå ?

	Nei, røyker ikke	Ja, røyker ukentlig	Ja, røyker daglig
Du	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig
Ektefelle/samboer	☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

53. Røykes det **innendørs** hjemme ?

Nei, det røykes ikke innendørs	Ja, det røykes ukentlig innendørs	Ja, det røykes daglig innendørs
☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

54. Ble det røykt innendørs hjemme etter barnets første leveår ?

Nei, det ble ikke røykt innendørs	Ja, det røykes ukentlig innendørs	Ja, det røykes daglig innendørs
☐	☐☐ sigaretter ukentlig	☐☐ sigaretter daglig

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Barnepass

55. Har barnet hatt daglig tilsyn av andre enn mor eller far **siden fødselen** ?

☐ Ja ☐ Nei

Hvis ja, oppgi hvem som har hatt tilsyn med barnet, start, slutt og varighet av tilsynet ?

	Barnets alder ved start med tilsynet	Barnets alder ved slutt med tilsynet	Tilsynets varighet
Dagmamma o.l. hjemme	☐☐ måneder	☐☐ måneder	☐☐ timer pr. uke
Dagmamma o.l. utenfor hjemmet	☐☐ måneder	☐☐ måneder	☐☐ timer pr. uke
Familiebarnehage	☐☐ måneder	☐☐ måneder	☐☐ timer pr. uke
Barnepark	☐☐ måneder	☐☐ måneder	☐☐ timer pr. uke
Barnehage	☐☐ måneder	☐☐ måneder	☐☐ timer pr. uke

56. Hva slags tilsyn har barnet nå ?
(flere kryss)

- Mor eller far hjemme ☐
- Dagmamma o.l. hjemme ☐
- Dagmamma o.l. utenfor hjemmet ☐
- Familiebarnehage ☐
- Barnepark ☐
- Barnehage ☐
- Annet ☐

Appendix 5

Questionnaire Q4b:
Questions on children’s health 2 years after birth in Norwegian

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Barneallergistudien i Trondheim

Spørreskjema om barnets helse ved 2 eller 6 års alder

Skriv tydelige tall og kryss. Bruk **svart** eller **blå** penn.

Utfylt dato (dd.mm.åå) ☐☐.☐☐.☐☐

1. Har barnet **noen gang** hatt pustevansker ?

   ☐ Ja ☐ Nei ☐ Vet ikke

2. Har barnet **noen gang** hatt episoder med piping i brystet ?

   ☐ Ja ☐ Nei ☐ Vet ikke

3. Har barnet **noen gang** hatt episoder med surkling eller tetthet i brystet ?

   ☐ Ja ☐ Nei ☐ Vet ikke

4. Har barnet **noen gang** hatt tørr hoste om natten unntatt ved forkjølelse eller andre luftveisinfeksjoner ?

   ☐ Ja ☐ Nei ☐ Vet ikke

5. Har barnet **noen gang** hatt episoder med hvesing eller tung pust ?

   ☐ Ja ☐ Nei ☐ Vet ikke

Hvis du har svart "Ja" på **minst ett** av spørsmålene over så fortsetter du med spørsmål 6.
Hvis du har svart "Nei" på **alle** spørsmålene ovenfor, gå til spørsmål 18.

---

6. Har barnet **noen gang** hatt anfall av piping, surkling eller tetthet i brystet i ro, når han/hun ikke er forkjølet ?

   ☐ Ja ☐ Nei ☐ Vet ikke

7. Har barnet hatt piping, surkling eller tetthet i brystet de **siste 12 måneder** ? (ett kryss)

   ☐ Ja, nesten daglig
   ☐ Ja, 1-3 ganger pr. uke
   ☐ Ja, 1-3 ganger pr. måned
   ☐ Ja, sjeldnere enn 1 gang pr. måned
   ☐ Nei

---

8. **I de siste 12 månedene** : Har barnet ditt vanligvis virket tett i brystet eller hostet opp slim :

Ved forkjølelse ?	☐ Ja	☐ Nei	☐ Vet ikke
Når han/hun ikke var forkjølet ?	☐ Ja	☐ Nei	☐ Vet ikke
Er barnet ditt tett i brystet eller hoster opp slim på de fleste dager (4 eller flere dager i uken, så lenge som 3 måneder i året) ?	☐ Ja	☐ Nei	☐ Vet ikke

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9. **I de siste 12 månedene** : Har barnet ditt hatt tung pust, tetthet eller piping i brystet :

	Ja	Nei	Vet ikke
Under eller etter fysisk aktivitet ?	☐	☐	☐
Når han/hun **ikke** har vært fysisk aktiv ?	☐	☐	☐

10. **I de siste 12 månedene** : Har barnet ditt hatt tung pust, tetthet eller piping i brystet når :

	Ja	Nei	Vet ikke
Han/hun var forkjølet eller hadde influensa ?	☐	☐	☐
Han/hun **ikke** var forkjølet eller hadde influensa ?	☐	☐	☐

11. Har barnet ditt **noen gang** våknet opp med :

	Ja	Nei	Vet ikke
Pustevansker ?	☐	☐	☐
Tetthet i brystet ?	☐	☐	☐

12. Forårsaker noe av det følgende piping, surkling eller tetthet i brystet ? (besvar alle spørsmål)

	Ja	Nei
Nyklippet gress, blomster, eller trær	☐	☐
Kontakt med dyr	☐	☐
Re senger eller husrengjøring	☐	☐
Løp eller annen aktivitet	☐	☐
Kulde	☐	☐
Annet	☐	☐

13. Har barnet **noen gang** fått stilt diagnosen astma av lege ?

☐ Ja ☐ Nei

Hvis nei, gå til spørsmål 18.

Hvis ja, hvor gammel var barnet første gang det hadde astma ?

☐☐ år ☐☐ måneder

14. Har barnet fremdeles astma ?

☐ Ja ☐ Nei

15. Hvis barnet ikke lenger har astma, hvor gammelt var barnet da astmaen forsvant ?

☐☐ år ☐☐ måneder

16. Har barnet **noen gang** fått behandling av lege eller vært innlagt i sykehus for astma ?

☐ Ja ☐ Nei

17. Har barnet i løpet av de **siste 12 måneder** brukt tabletter, inhalasjonsmedisiner eller annen behandling for piping, tetthet i brystet eller astma ?

☐ Ja ☐ Nei ☐ Vet ikke

Hvis ja, gjør rede for medisinene barnet bruker :
(Med fast medisin mener vi medisin som brukes hver dag minst to måneder i året)

	Ved behov	Fast medisin	Før, under eller etter anstrengelse
Acculate	☐	☐	☐
Airomir	☐	☐	☐
Atrovent	☐	☐	☐
Bambec	☐	☐	☐
Becotide	☐	☐	☐
Berotec	☐	☐	☐
Bricanyl	☐	☐	☐
Flunitec	☐	☐	☐
Flutide	☐	☐	☐
Lomudal	☐	☐	☐
Oxis	☐	☐	☐
Pulmicort	☐	☐	☐
Salbuvent	☐	☐	☐
Serevent	☐	☐	☐
Seretide	☐	☐	☐
Singulair	☐	☐	☐
Ventoline	☐	☐	☐

18. Har barnet **noen gang** hatt tett nese, eller hatt rennende nese uten å være forkjølet ?

☐ Ja ☐ Nei ☐ Vet ikke

Hvis ja, når har eller har barnet hatt tett nese eller rennende nese uten å være forkjølet ?
(flere kryss)

☐ Vår ☐ Sommer ☐ Høst ☐ Vinter

19. Har barnet hatt tett nese eller rennende nese uten å være forkjølet **siste 12 måneder** ?

☐ Ja ☐ Nei ☐ Vet ikke

20. Har barnet **noen gang** hatt høysnue, neseallergi eller allergisk øyekatarr ?

☐ Ja ☐ Nei ☐ Vet ikke

Hvis ja, hvor gammelt var barnet første gang det hadde høysnue, neseallergi eller allergisk øyekatarr ?

☐☐ år ☐☐ måneder

21. Har barnet **noen gang** hatt eksem ?

☐ Ja ☐ Nei ☐ Vet ikke

Hvis ja, hvor gammelt var barnet første gang det hadde eksem ?

☐☐ år ☐☐ måneder

22. Har barnet **noen gang** hatt kløende utslett som har kommet og gått i minst 6 måneder ?

☐ Ja ☐ Nei ☐ Vet ikke

23. Har barnet i løpet av de **siste 12 månder** brukt noen medisiner, salver, kremer, tabletter eller naturmedisiner mot eksem ?

☐ Ja ☐ Nei ☐ Vet ikke

24. Har barnet i løpet av de **siste 12 måneder** brukt allergimedisiner ?

☐ Ja ☐ Nei ☐ Vet ikke

25. Er barnet allergitestet med hudtest/prikktest eller blodprøve ?

☐ Ja ☐ Nei ☐ Vet ikke

Hvis ja, hvilken allergi ble påvist ? (flere kryss)

Pollen ☐
Dyrehår ☐
Husstøv ☐
Annen ☐
Vet ikke ☐

26. Har barnet **noen gang** fått behandling av lege eller vært innlagt i sykehus for :
(besvar alle spørsmål)

	Ja	Nei
Høysnue, neseallergi eller allergisk øyekatarr ?	☐	☐
Eksem ?	☐	☐
Elveblest (urtikaria) ?	☐	☐

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27. Har barnet hatt noen av sykdommene nedenfor ? (besvar alle spørsmål)

	Ja	Nei	Hvis ja, antall ganger	Er noen av sykdommene behandlet med penicillin/antibiotika ? Ja	Nei	Vet ikke	Hvis ja, hvor mange behandlinger
Forkjølelse	☐	☐	☐☐	☐	☐	☐	☐☐
Ørebetennelse	☐	☐	☐☐	☐	☐	☐	☐☐
Bronkitt	☐	☐	☐☐	☐	☐	☐	☐☐
RS-virusinfeksjon	☐	☐	☐☐	☐	☐	☐	☐☐
Falsk krupp	☐	☐	☐☐	☐	☐	☐	☐☐
Lungebetennelse	☐	☐	☐☐	☐	☐	☐	☐☐
Urinveisinfeksjon	☐	☐	☐☐	☐	☐	☐	☐☐
Mage-tarminfeksjon	☐	☐	☐☐	☐	☐	☐	☐☐

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28. Opplysninger om sykehusinnleggelser :

Siste innleggelse - dato ? (dd.mm.åå) ☐☐.☐☐.☐☐

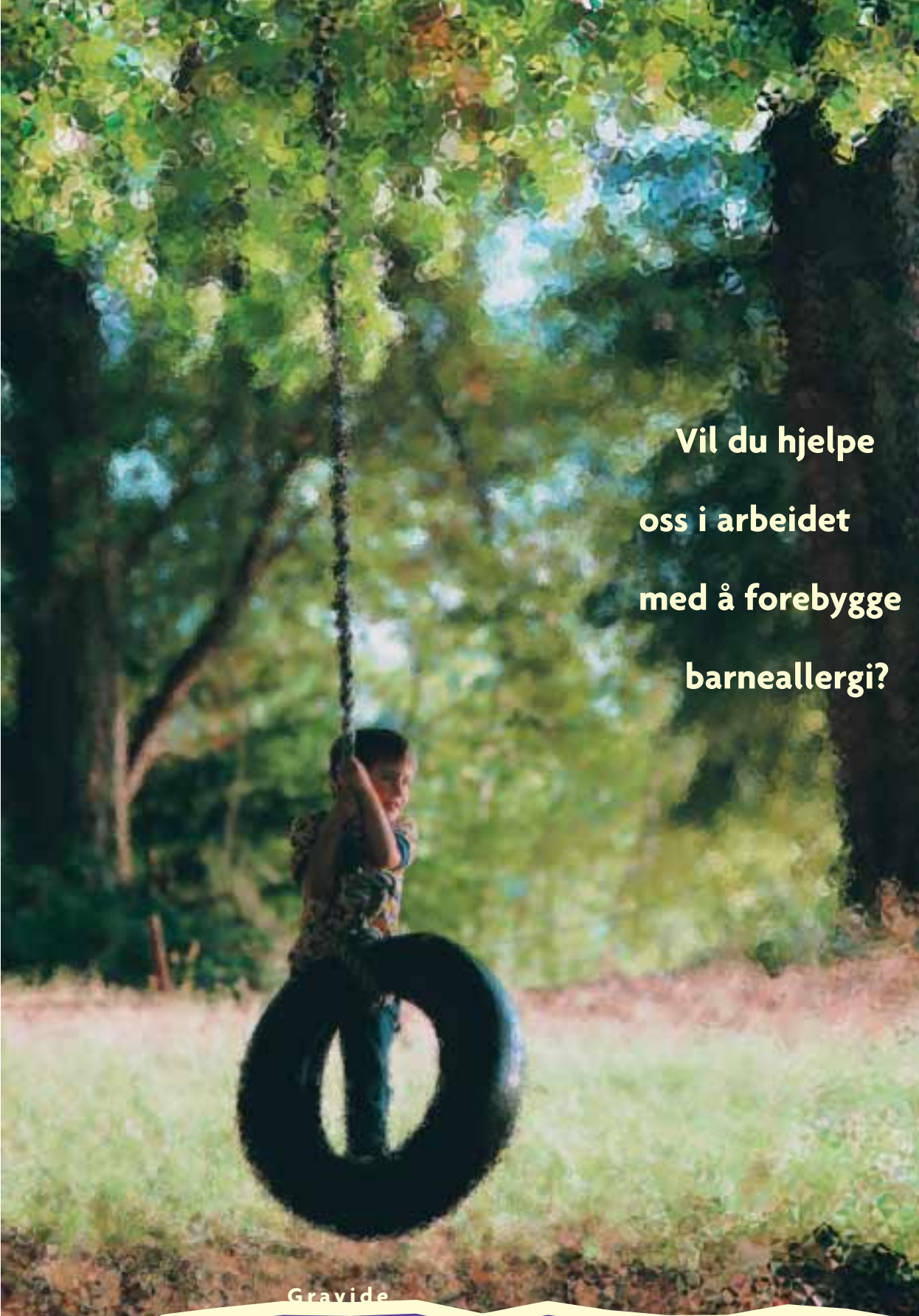
Siste innleggelse - hvor ? _____

Barnets fastlege : _____

Legesenter : _____

Appendix 6

Information brochure and informed consent (control cohort) in Norwegian



Vil du hjelpe oss i arbeidet med å forebygge barneallergi?

Gravide

BARNEALLERGI STUDIEN I TRONDHEIM

PREVENTION OF ATOPY AMONG CHILDREN IN TRONDHEIM.

PACT

NTNU Norges teknisk-naturvitenskapelige universitet

SINTEF Unimed

TRONDHEIM KOMMUNE

ORIENTERING OM BARNEALLERGI STUDIEN I TRONDHEIM

HV

TIL DEG SOM ER GRAVID

Trondheim kommune, forskningsmiljøene ved NTNU og SINTEF Unimed og Folkehelsa går nå i gang med en stor studie viet barneallergi. Her vil vi undersøke effekten av å forebygge allergisykdommer som astma, eksem og høysnue hos små barn.

Til det trenger vi hjelp fra deg som er gravid.

HVA ØNSKER VI Å STUDERE?

I den vestlige del av verden har tallet på barn med allergiplager steget betydelig de siste 10-15 årene. Årsakene til denne økningen er ikke kjent, men mange fagfolk mener at miljøforurensning, endrede kost- og livsstilsvaner og forandringer i virus- og bakterieinfeksjoner har betydning.
I denne studien vil vi se på virkningene av flere forebyggende tiltak. I tillegg vil vi undersøke samspillet mellom flere mulige årsaker til barneallergi.

HVORDAN SKAL STUDIEN GJENNOMFØRES?

Vi vil studere effektene av ulike typer forebyggende tiltak. For å få til det, må vi sammenligne gravide/ barn som følger dagens opplegg ved legekontor og helsestasjoner (kontrollgruppen), med andre som skal prøve ut nye tiltak fra sommeren 2001.

Med dette inviterer vi deg til å delta i kontrollgruppen som får de råd og den veiledning som gis i dag.

A INNEBÆRER DET Å VÆRE MED I KONTROLLGRUPPEN?

Å delta i kontrollgruppen innebærer å svare på spørreskjema om allergiske sykdommer i familie/slekt, om livsstil og boforhold (Livsstilskjema), og om barnets helse og sykdom (Helseskjemaet).

Livsstilsskjemaet besvares av gravide, og etter fødselen skal det fylles ut ved seksukers-undersøkelsen og ved ett- og toårsundersøkelsene på helsestasjonene.

Helseskjemaet skal besvares ved to- og seksårsalderen.

Noen barn med allergisykdom eller plager som kan skyldes allergi, vil få tilbud om vanlig klinisk undersøkelse, måling av lungefunksjon (pusteprøver) og allergiutredning (allergitest og blodprøver), så fremt dette ikke er utført hos den ordinære helsetjenesten. I tillegg vil et tilfeldig utvalg av friske barn få et tilbud om slik utredning. Dersom barnet er undersøkt og utredet for allergi, kan vi få vite resultatene av slike undersøkelser fra barnets helsejournaler.

TILLEGGSUNDERSØKELSE OM ÅRSAKER TIL BARNEALLERGI

Du får med dette også et tilbud om å delta i en tilleggsstudie der vi skal undersøke årsaker til utvikling av barneallergi.

I denne studien vil vi følge et mindre utvalg av barn (600 barn) fram til de er to år. Her vil vi studere utviklingen av bakteriesammensetningen i barnets tarm. Dette gjør vi ved å undersøke bakteriesammensetningen i avføringen og samtidig studere faktorer som påvirker denne. Når vi kjenner bakteriesammensetningen i avføringen og vet om den endrer seg de to første leveårene, kan vi studere om dette har betydning for modningen av immunapparatet og en eventuell utvikling av barneallergi.

Til denne studien trenger vi i tillegg til opplysningene fra kontrollgruppen, avføringsprøve av mor før og ved fødselen sammen med bakterieprøve av skjeden ved fødselen. Fra barnet er det nødvendig med avføringsprøver ved 10 dager, 6 uker, 4 måneder, 1 år og 2 år. I tillegg vil det være ønskelig med blodprøve fra barnet ved de samme tidspunktene, og fra mor ved fødsel. Blodprøvene vil bli tatt ved Regionsykehuset i Trondheim, av personell som er spesialtrent til å ta blodprøver av små barn. Vi tilbyr bedøvelseskrem på huden før prøvetakingen.

Hos noen av dere som deltar i tilleggsstudien ønsker vi også å undersøke om innelufta i barnets hjem inneholder midd, muggsopp og allergiframkallende stoffer fra husdyr, samt måle nikotininnholdet i en liten hårprøve fra barnet. Dette fordi vi ønsker å se om det er en sammenheng mellom det vi finner her og en eventuell utvikling av allergi hos barnet. Et utvalg av de som har tegn til allergi ved toårsalderen og en tilsvarende gruppe uten slike tegn, vil få tilbud om hjemmebesøk. Besøket vil innebære prøvetaking av innelufta i hjemmet.

VEDLAGT FØLGER ET SKJEMA FOR SAMTYKKE TIL Å DELTA I KONTROLLGRUPPEN OG ET SKJEMA FOR Å DELTA I TILLEGGSSTUDIEN.

Hvis du har spørsmål nå eller seinere om studien og deltakelsen i den kan du kontakte:

Kommuneoverlege Helge Garåsen, Trondheim kommune Tlf. 73 54 87 47
Prosjektsekretær Anita Stølan, Institutt for samfunnsmedisinske fag og allmennmedisin Tlf. 73 59 68 97
Stipendiat og prosjektkoordinator Jon A. Jenssen, SINTEF Unimed Tlf. 73 59 10 06

Jon A. Jenssen *Stipendiat/siv.ing*
Torbjørn Øien *Stipendiat/lege*
Ola Storrø *Stipendiat/lege*
Helge Garåsen *Kommuneoverlege*

NÅR DU HAR SKREVET UNDER SAMTYKKEERKLÆRINGEN RIVES DEN AV OG LEVERES.

SAMTYKKE-ERKLÆRING TIL KONTROLLGRUPPEN

Vi spør om tillatelse til å sammenholde opplysningene fra spørreskjema med opplysninger i:

Barnets helsekort, Barnets primærlegejournal og Barnets sykehusjournal.

Studien er vurdert av Regional Etisk Komite for Midt-Norge. Tillatelse til oppretting av forskningsregister er gitt av Datatilsynet.

All personinformasjon vil bli behandlet strengt konfidensielt, og all databearbeiding vil foregå på anonymiserte datasett.

Videre ber vi om at du skriftlig bekrefter at du vil delta i studien. Deltakelse i studien er frivillig, og et samtykke kan når som helst trekkes tilbake uten nærmere begrunnelse.

Deltakelsen medfører

- å besvare spørreskjema om risikofaktorer for barneallergi og om barnets helse
- utredning av allergi hos barnelege

Jeg samtykker i å delta i Barneallergistudien

ja ☐ nei ☐

Og at opplysningene sammen med resultatene fra tilleggsundersøkelser oppbevares til forskningsformål.

Og jeg tillater at opplysningene om barnets helse i spørreskjemaene sammenholdes med informasjon i barnets helsekort, primærlegejournal og sykehusjournal.

ja ☐ nei ☐

Trondheim den / /

……

Signatur

PACT

VEND!

SAMTYKKE-ERKLÆRING TIL DELSTUDIEN

Du har samtykket i å delta i kontrollgruppen. Dersom du er villig til å delta i Delstudien, ber vi om at du skriftlig bekrefter dette. Deltakelse i studien er frivillig, og et samtykke kan når som helst trekkes tilbake uten nærmere begrunnelse.

Deltakelsen medfører som en del av kontrollgruppen

- å besvare spørreskjema om risikofaktorer for barneallergi og om barnets helse
- utredning av allergi hos barnelege

I tillegg medfører deltakelsen

- innlevering av avføringsprøver og taking av blodprøver

Jeg samtykker i å delta i Delstudien,

ja ☐ nei ☐

og at opplysningene sammen med avføringsprøver og blodprøver oppbevares til forskningsformål.

Trondheim den / /

……

Signatur

HVIS DU HAR SPØRSMÅL OM SAMTYKKE-ERKLÆRINGEN, VENNLIGST KONTAKT:

Kommuneoverlege Helge Garåsen,
Trondheim kommune
Tlf. 73 54 87 47

Prosjektsekretær Anita Stølan,
Institutt for samfunnsmedisinske fag og allmennmedisin
Tlf. 73 59 68 97

Projektkoordinator Jon A Jenssen,
SINTEF Unimed
Tlf. 73 59 10 06

Projektveileder Professor Roar Johnsen,
Institutt for samfunnsmedisinske fag og allmennmedisin
Tlf. 73 59 75 80

PACT

KOPI AV SAMTYKKE-ERKLÆRING

Samtykke-erklæring til kontrollgruppen

Vi spør om tillatelse til å sammenholde opplysningene fra spørreskjema med opplysninger i:

Barnets helsekort, Barnets primærlegejournal og Barnets sykehusjournal.

Studien er vurdert av Regional Etisk Komite for Midt-Norge.
Tillatelse til oppretting av forskningsregister er gitt av Datatilsynet.

All personinformasjon vil bli behandlet strengt konfidensielt, og all databearbeiding vil foregå på anonymiserte datasett.

Videre ber vi om at du skriftlig bekrefter at du vil delta i studien. Deltakelse i studien er frivillig, og et samtykke kan når som helst trekkes tilbake uten nærmere begrunnelse.

Deltakelsen medfører
- å besvare spørreskjema om risikofaktorer for barneallergi og om barnets helse
- utredning av allergi hos barnelege

Jeg samtykker i å delta i Barneallergistudien

ja ☐ nei ☐

Og at opplysningene sammen med resultatene fra tilleggsundersøkelser oppbevares til forskningsformål.

Og jeg tillater at opplysningene om barnets helse i spørreskjemaene sammenholdes med informasjon i barnets helsekort, primærlegejournal og sykehusjournal.

ja ☐ nei ☐

Trondheim den / /

……..……..……...
Signatur

Samtykke-erklæring til delstudien

Du har samtykket i å delta i kontrollgruppen. Dersom du er villig til å delta i Delstudien ber vi om at du skriftlig bekrefter dette. Deltakelse i studien er frivillig, og et samtykke kan når som helst trekkes tilbake uten nærmere begrunnelse.

Deltakelsen medfører som en del av Hovedstudien
- å besvare spørreskjema om risikofaktorer for barneallergi og om barnets helse
- utredning av allergi hos barnelege

I tillegg medfører deltakelsen
- innlevering av avføringsprøver og taking av blodprøver

Jeg samtykker i å delta i Delstudien,

ja ☐ nei ☐

og at opplysningene sammen med avføringsprøver og blodprøver oppbevares til forskningsformål.

Trondheim den / /

……..……..……...
Signatur

PACT

HVIS DU HAR SPØRSMÅL OM SAMTYKKE-ERKLÆRINGEN, VENNLIGST KONTAKT:

Kommuneoverlege Helge Garåsen,
Trondheim kommune
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Prosjektsekretær Anita Stølan,
Institutt for samfunnsmedisinske fag og allmennmedisin
Tlf. 73 59 68 97

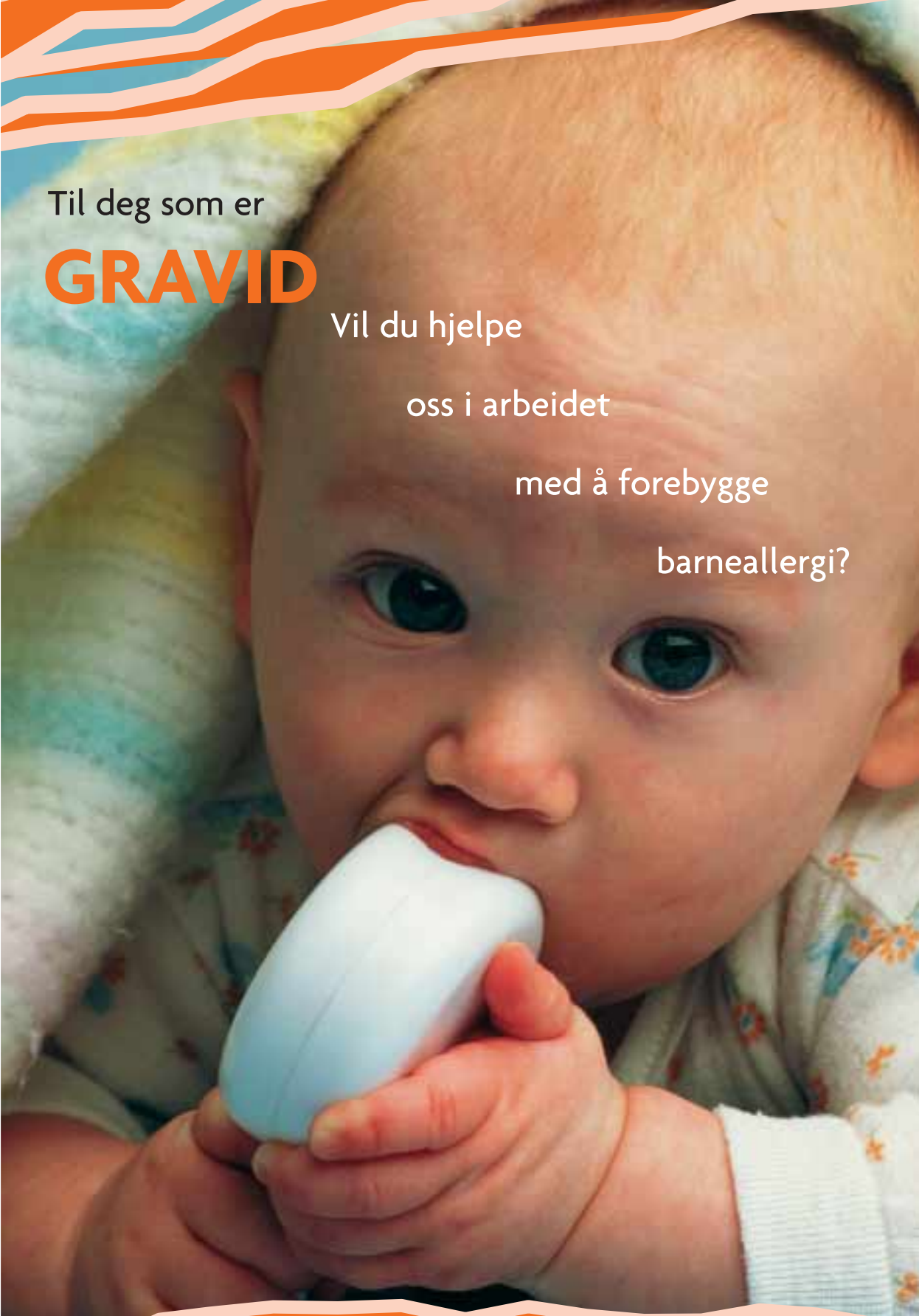
Projektkoordinator Jon A Jenssen,
SINTEF Unimed
Tlf. 73 59 10 06

Projektveileder Professor Roar Johnsen,
Institutt for samfunnsmedisinske fag og allmennmedisin
Tlf. 73 59 75 80

Rosenborg Grafisk Kommunikasjon AS - R9894TB

Appendix 7

Information brochure and informed consent (intervention cohort) in Norwegian



Til deg som er

GRAVID

Vil du hjelpe oss i arbeidet med å forebygge barneallergi?

SAMTYKKE-ERKLÆRING

BARNEALLERGISTUDIEN I TRONDHEIM

PREVENTION OF ATOPY AMONG CHILDREN IN TRONDHEIM.

PACT

NTNU Norges teknisk-naturvitenskapelige universitet

SINTEF Unimed

TRONDHEIM KOMMUNE

ORIENTERING OM **BARNE**

TIL DEG SOM ER GRAVID

Trondheim kommune, forskningsmiljøene ved SINTEF Unimed og Det Medisinske fakultet har startet en stor studie om barneallergi. Hovedhensikten er å forebygge allergiske sykdommer som astma, eksem og høysnue hos små barn. Best effekt oppnås hvis tiltakene iverksettes tidlig i svangerskapet.

Derfor henvender vi oss til deg som er gravid.

Hva ønsker vi å studere?

I den vestlige del av verden har antallet barn med allergiplager steget betydelig de siste 30-40 årene. Årsaken til denne økningen er ikke kjent, men mange fagfolk mener at miljøforurensing, endrede kost- og livsstilsvaner og forandringer i virus og bakteriesammensetningen i miljøet vårt har betydning. I denne undersøkelsen studerer vi virkningene av flere forebyggende tiltak. Samtidig undersøker vi samspillet mellom flere mulige årsaker til barneallergi.

Hvordan skal studien gjennomføres?

Vi vil studere effekten av å :

- Øke inntak av omega 3 fettsyrer (viktig bestandel i fet fisk og tran) i svangerskapet og barnets to første leveår.
- Redusere eksponering for tobakksrøyk for barnet i fosterlivet og de første leveår.
- Utbedre fuktproblem og fuktskader i boliger for å redusere eksponeringen for husstøvmidd og sopp.

Gjennomføringen av disse tiltakene starter ved svangerskapskontrollene i Trondheim fra mai 2002 (tiltaksgruppen). For å måle effekten av tiltakene vil tiltaksgruppen bli sammenliknet med en kontrollgruppe. Kontrollgruppen har siden høsten 2000 fulgt vanlig opplegg ved legekontor og helsestasjoner.

Vi inviterer deg til å delta i **tiltaksgruppen** som skal få ekstra råd og veiledning i svangerskapet og barnets to første leveår.

ALLERGISTUDIEN I TRONDHEIM

Hva innebærer det å være med i tiltaksgruppen?

Å delta i tiltaksgruppen innebærer å svare på spørreskjema om allergiske sykdommer i familie/slekt, om livstil og boforhold (livstilsskjema) og om barnets helse og sykdom (helseskjema).

Livsstilsskjemaet besvares av gravide, og etter fødselen skal det fylles ut ved 6 ukersundersøkelsen og ved ett- og toårsundersøkelsene på helsestasjonene.

Helseskjemaet skal besvares ved to- og seksårsalderen.

Tiltakene

Alle vil få generell veiledning om kost, inneklima og røyking. I tillegg vil spørreskjemaet bli brukt til å identifisere de som har behov for tilpasset veiledning innenfor de tre tiltaksområdene. Det vil blant annet bli arrangert matlagingskurs, røykeavvenningskurs og gitt bistand til å avdekke fuktproblem i aktuelle boliger.

Hos noen av dere som deltar vil vi også undersøke om innelufta i barnets hjem inneholder husstøvmidd, muggsopp og allergiframkallende stoffer fra husdyr, samt måle nikotininnholdet i en liten hårprøve fra barnet. Dette gjør vi for å få objektive mål på om de nye tiltakene er effektive med hensyn til å endre risikofaktorene for allergisk sykdom.

Noen foreldre med barn med allergisk sykdom eller allergiske plager, vil få tilbud om vanlig klinisk undersøkelse av barnet hos barnelege med måling av lungefunksjon (pusteprøver) og allergiutredning (allergitest og blodprøver). I tillegg vil et tilfeldig utvalg av foreldre med friske barn få et tilbud om slik utredning av barnet.

Vi ber om tillatelse til å innhente opplysninger fra helsekort for gravide og barnets helsejournaler.

VEDLAGT FØLGER ET SKJEMA FOR SAMTYKKE TIL Å DELTA I TILTAKSGRUPPEN

Hvis du har spørsmål nå eller seinere om studien og deltakelsen i den kan du kontakte:

Kommuneoverlege Helge Garåsen, Trondheim kommune	Tlf.	73 54 87 47
Prosjektsekretær Anita Stølan, Sintef Unimed	Tlf.	73 59 68 97
Stipendiat og prosjektkoordinator Jon A. Jenssen, SINTEF Unimed	Tlf.	73 59 10 06
Projektveileder Professor Roar Johnsen, Institutt for samfunnsmedisinske fag og allmennmedisin	Tlf.	73 59 75 80

Jon A. Jenssen *Stipendiat/siv.ing*

Torbjørn Øien *Stipendiat/lege*

Ola Storrø *Stipendiat/lege*

Helge Garåsen *Kommuneoverlege*

Når du har skrevet under samtykkeerklæringen rives den av og leveres.

SAMTYKKE-ERKLÆRING TIL TILTAKSGRUPPEN

Vi spør om tillatelse til å sammenholde opplysningene fra spørreskjema med opplysninger i:

Helsekort for gravide
Barnets helsekort
Barnets primærlegejournal
Barnets sykehusjournal

Studien er vurdert av Regional Komite for medisinsk forskningsetikk, Region Midt-Norge. Tillatelse til oppretting av forskningsregister er gitt av Datatilsynet.

All personinformasjon vil bli behandlet strengt konfidensielt, og all databearbeiding vil foregå på avidentifiserte datasett. Det betyr at forskeren ikke kan kan idenfisere enkeltpersoner på analysefilen.

Videre ber vi om at du skriftlig bekrefter at du vil delta i studien. Deltakelse i studien er frivillig, og du kan når som helst trekke deg fra studien uten nærmere begrunnelse.

Deltakelsen medfører

- å besvare spørreskjema om leve- og livsstilsfaktorer og om barnets helse med tanke på barneallergi
- å motta veiledning om kosthold, røyking og inneklima
- utredning av allergi hos barnelege med blodprøvetaking, allergitesting og lungefunksjonsprøver

Jeg samtykker i å delta i Barneallergistudien

ja ☐ nei ☐

…og at opplysningene sammen med resultatene fra tilleggsundersøkelser oppbevares til forskningsformål.

…og jeg tillater at opplysningene om barnets helse i spørreskjemaene sammenholdes med informasjon i helsekort for gravide, barnets helsekort, primærlegejournal og sykehusjournal.

ja ☐ nei ☐

Trondheim den / /

……..……..……...

Signatur

PACT

VEND!

Hvis du har spørsmål om samtykkeerklæringen, vennligst kontakt:

Kommuneoverlege Helge Garåsen,
Trondheim kommune
Tlf. 72 54 87 47

Prosjektsekretær Anita Stølan,
SINTEF Unimed
Tlf. 73 59 68 97

Projektkoordinator Jon A Jenssen,
SINTEF Unimed
Tlf. 73 59 10 06

Projektveileder Professor Roar Johnsen,
Institutt for samfunnsmedisinske fag og allmennmedisin
Tlf. 73 59 75 80

PACT

KOPI AV SAMTYKKE-ERKLÆRING TIL TILTAKSGRUPPEN.

Vi spør om tillatelse til å sammenholde opplysningene fra spørreskjema med opplysninger i:

Helsekort for gravide
Barnets helsekort
Barnets primærlegejournal
Barnets sykehusjournal

Studien er vurdert av Regional Komite for medisinsk forskningsetikk, Region Midt-Norge. Tillatelse til oppretting av forskningsregister er gitt av Datatilsynet.

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Videre ber vi om at du skriftlig bekrefter at du vil delta i studien. Deltakelse i studien er frivillig, og du kan når som helst trekke deg fra studien uten nærmere begrunnelse.

Deltakelsen medfører

- å besvare spørreskjema om leve- og livsstilsfaktorer og om barnets helse med tanke på barneallergi
- å motta veiledning om kosthold, røyking og inneklima
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Jeg samtykker i å delta i Barneallergistudien

ja ☐ nei ☐

…og at opplysningene sammen med resultatene fra tilleggsundersøkelser oppbevares til forskningsformål.

…og jeg tillater at opplysningene om barnets helse i spørreskjemaene sammenholdes med informasjon i helsekort for gravide, barnets helsekort, primærlegejournal og sykehusjournal.

ja ☐ nei ☐

Trondheim den / /

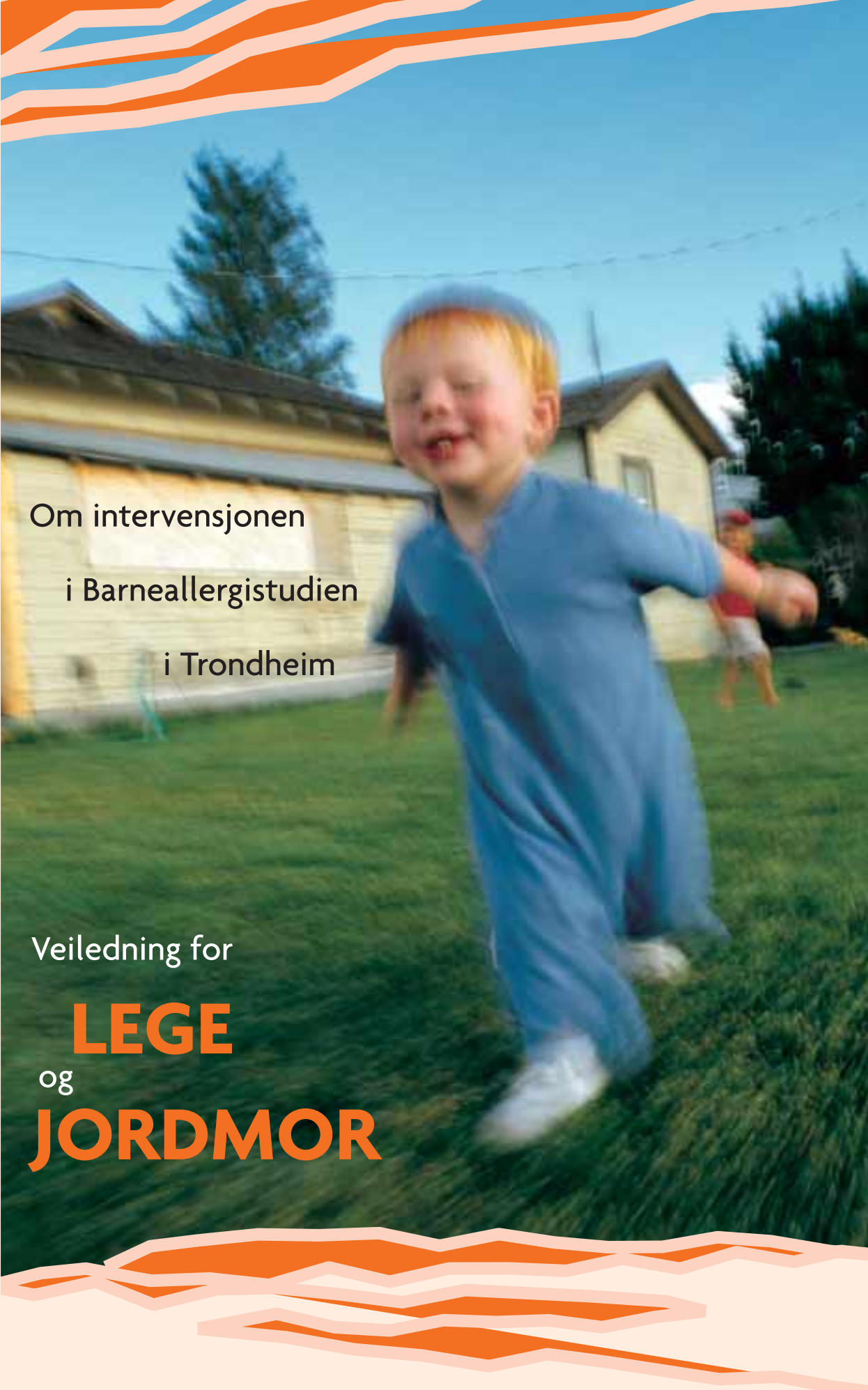
…….....…….……...

Signatur

Rosenborg Grafisk Kommunikasjon AS - R17953A1

Appendix 8

Information brochure and advice to health worker regarding the intervention topics in Norwegian



Om intervensjonen i Barneallergistudien i Trondheim

Veiledning for

LEGE
og
JORDMOR

BARNEALLERGISTUDIEN I TRONDHEIM

PREVENTION OF ATOPY AMONG CHILDREN IN TRONDHEIM.

PACT

NTNU Norges teknisk-naturvitenskapelige universitet

SINTEF Unimed

TRONDHEIM KOMMUNE

INTERVENSJONEN I BARNE

RØYKEAVVENNING

Målsetting

Målet med røykeintervensjonen er å få flest mulig av de gravide som røyker og ektefelle/samboer som røyker til å slutte å røyke og at kvinner som slutter å røyke i svangerskapet forblir røykfrie etter fødselen.

Røykeavvenningsprogrammer har vist å øke muligheten for at gravide slutter å røyke

- Oppmerksomhet mot problemet i svanger skapsomsorgen har effekt i seg selv.
- Tilbud om røykeavvenning skal være obligatorisk og rutinemessig i all svangerskaps-omsorg slik som BT-kontroll, veiing, urin kontroller osv…

Hvorfor røykende kvinner ikke slutter å røyke når de er gravide

- Negativ innvirkning på den gravide av røykeslutt, fordi røyking er en måte for henne å mestre stress på og å klare en strevsom hverdag.
- En forestilling om at røykeslutt gir større babyer, mer slitsom og smertefull fødsel med risiko for keisersnitt.
- Ukompliserte tidligere svangerskap med friske barn, og kjennskap til andre kvinner som har røkt i svangerskapet uten følger verken for svangerskap, fødsel eller for barna.
- Det er en økende sosial ulikhet mellom røykere og ikkerøykere blant gravide.

Røykesluttprogrammer bør tilpasses de lokale forhold

(kulturelle, sosiale, utdanningsmessige forhold osv.)

- Et røyeintervensjonsprogram som fungerer i et land/kultur/samfunn behøver ikke å fungere et annet sted.
- Brukermedvirkning i utformingen av det "lokale" programmet er viktig.
- Helsearbeiderne bør ha innvirkning på programmet de skal bruke i sin daglige praksis.
- Helsearbeiderne vil ha nytte av opplæring i røykeavvenning, selv om dette kun er dokumentert å gi øket aktivitet i røyke-avvenningen, men ikke sikkert øket effekt av denne.

Trondheim kommune tilbyr:

- samarbeid med resursshelsestasjon for røykeavvenning.
- strukturert røykeavvenigskurs over 3 kvelder.

Litteratur røykeavvenning

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ALLERGISTUDIEN I TRONDHEIM

KOSTHOLD

Målsetting

Målet med kostholdsintervensjonen er å øke inntaket av omega-3 fettsyrer, både under svangerskapet og i barnets to første leveår. I svangerskapet ønsker vi at alle gravide spiser minst to måltider i uken med feit fisk som laks, ørret, sild, makrell, uer og kveite. I tillegg ønsker vi at den gravide tar 5 ml tran under hele svangerskapet. Vi ønsker også at alle barn tar tran fra 4-6 ukers alder, og at feit fisk blir introdusert som middagsmat og pålegg fra 6 måneders alder, og at barnet spiser minst to slike måltider i uken fra 6 måneders alder. Unntatt fra dette er barn som har høy risiko for å utvikle atopisk sykdom. *Et høyrisikobarn kan defineres som et barn hvor både mor og far har betydelig allergisk sykdom, eller mor og et søsken har betydelig allergisk sykdom.* **Anbefalingene som gis i intervensjonen bygger på anbefalinger gitt av Statens råd for ernæring og fysisk aktivitet.**(1)

Bakgrunnen for kostholdsintervensjonen er en australsk studie som viser at inntak av minst ett måltid med fet fisk i uken reduserer forekomsten av astma hos barn i alderen 9-11 år (2). Et høyt kostinntak av fett fra planter (omega-6) i forhold til fett fra fisk (omega-3) kan være en risikofaktor for å utvikle atopisk sykdom (3). Forholdet mellom ulike langkjedede flerumettede fettsyrer i blod viser seg og være annerledes hos mødre med atopi og mødre som får barn med atopi. Dette tyder på at atopi har en sammenheng med en forstyrret fettsyremetbolisme (4,5). Den gravides kosthold kan derfor se ut til å ha betydning for barnets sykdomsutvikling. I en velernært populasjon er omega-3 fettsyre nivåene hos de nyfødte påvirket av nivåene hos moren (6). Hvis mor tar tilskudd av omega-3-fettsyrer, f.eks i form av tran, fører det til en høyere konsentrasjon av disse fettsyrene både i blod og morsmelk (7,8). Kvinner som inkluderer fisk i kostholdet, har høyere konsentrasjon av omega-3fettsyrer i morsmelken enn kvinner som lever på et vegetarisk kosthold (9).

Kosthold under graviditet

Det foreligger studier som tyder på at sensibilisering med allergener kan skje allerede mellom 15. og 22. svangerskapsuke. Hvilken klinisk betydning denne sensibiliseringen har for senere utvikling av allergi er uklart. Det er foretatt klinisk prospektive studier hvor det er gjort forsøk på å eliminere allergen fra mors kost i svangerskapet, uten at dette har ført til noen redusert forekomst av allergisykdom hos barnet. En slik diett kan imidlertid ha negativ innvirkning på ernæringstilstanden til mor og foster, og gi lavere fødselsvekt.

Vi har derfor fra et allergisynspunkt ingen holdepunkter for å anbefale spesielle kostråd til gravide, antigenunnvikelse under svangerskapet hos kvinner med høy risiko for atopisk sykdom reduserer med liten sannsynlighet risikoen for at hun skal få et atopisk barn (1,10).

Kostholdsintervensjonen under graviditet blir derfor

- Minst to måltider med feit fisk ukentlig (laks, ørret, sild, makrell, uer og kveite).
- Inntak av 5 ml tran daglig
- Ingen spesielle kostrestriksjoner under graviditet

Dagsbehovet av omega-3 dekkes av: 50g laks, 115g (høst)/30g (vår) makrell, 30g makrell i tomat, 25g sild, 500g torsk, 330g reke.

Litteratur kosthold

1. Forebyggende kostråd - notat til helsepersonell. Utviklet av Statens ernæringsråd i samarbeid med Statens næringsmiddeltilsyn og Norges Astma- og Allergiforbund og Folkehelsa, 1997.

2. Hodge L, Salome CM, Peat JK et al. Consumption of oily fish and childhood asthma risk. Med J Australia. 1996;164:137-40.

3. Kankaanpaa P, Nurmela K, Erkkila A et al. Polyunsaturated fatty acids in maternal diet, breast milk, and serum lipid fatty acids of infants in relation to atopy. Allergy 2001;56:633-8.

4. Yu G, Bjorksten B. Serum levels of phospholipid fatty acids in mothers and their babies in relation to allergic disease. Eur.J.Pediatr. 1998;157:298-303.

5. Duchen K, Yu G, Bjorksten B. Atopic sensitization during the first year of life in relation to long chain polyunsaturated fatty acid levels in human milk. Pediatr.Res. 1998;44:478-84.

6. Matorras R, Perteagudo L, Sanjurjo P, Ruiz JI. Intake of long chain w3 polyunsaturated fatty acids during pregnancy and the influence of levels in the mother on newborn levels. Eur.J.Obstet.Gynecol.Reprod.Biol. 1999;83:179-84.

7. Helland IB, Saarem K, Saugstad OD, Drevon CA. Fatty acid composition in maternal milk and plasma during supplementation with cod liver oil. Eur.J.Clin.Nutr. 1998;52:839-45.

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9. Sanders TA. Essential fatty acid requirements of vegetarians in pregnancy, lactation, and infancy. Am.J.Clin.Nutr. 1999;70:555S-9S.

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ALLERGISTUDIEN I TRONDHEIM

INNEKLIMA

Målsetting

Målsettingen er å få alle gravide til å gjøre enkle tiltak som bidrar til bedre luftskifte og færre innendørs fuktkilder.

Bakgrunnen for intervensjonen er faktarapporten om forebygging av astma (1) som konkluderer med at det er sterke holdepunkter for at personer som bor i boliger med fuktproblem har økt risiko for å utvikle allergi. Det er holdepunkter for at barn som vokser opp i boliger med fuktproblem løper en vesentlig større risiko for å utvikle allergisk sykdom, uavhengig av atopisk disposisjon. Dette er spesielt allergi knyttet til eksponering for husstøvmidd, dyreallergener og sopp (3,4 og 5).

En finsk undersøkelse har vist at langt de fleste fuktproblemene i boliger kan utbedres ved enkle grep, bl.a. bedre ventilasjon, eliminere fuktkilder og mindre bygningstekniske utbedringstiltak (2).

I følge faktarapporten om forebygging av astma hos barn (1) kan primærforebyggende tiltak særlig rettes mot familier der det er atopisk disposisjon. Følgende anbefalinger gis i faktarapporten:

- det bør etterstrebes å holde lavt nivå av husstøvmidd, særlig i sengemadrasser.
- det anbefales bedre ventilering av boligen.
- spesielt luftes soverom gjennom vindu.
- hvis det er identifisert fuktskader eller boligen generelt er fuktig bør skaden saneres.

Ekstra målsetting

I Barneallergistudien tas det sikte på å etablere et tilbud til de som kan ha mer omfattende fuktproblemer. Tilbudet vil bestå i inspeksjon og målinger for å avdekke fuktproblem og få profesjonelle råd om utbedringstiltak som er kvalitetsikret av Byggforsk.

Ved bruk av spørreskjema skal det identifiseres ca 450 boliger med høy sannsynlighet for å ha fuktproblem eller fuktskader. Følgende kriterier benyttes for å identifisere boliger med høy sannsynlighet for å ha fuktskade på bad eller i kjeller:

Avkryssing i spørreskjema for minimum
2 fuktproblem som ikke var utbedret (identifiserte 25% av kjellerne som hadde fuktskade eller 19% av kjellerne hvor det ble funnet sopp fuktindikator).
Dårlig ventilerte bad, dvs bad med som mangler spalte under dør og hvor døren til vanlig er lukket. (Ca 16% av boligene hadde denne tilstanden og på samtlige av disse badene ble det funnet fuktskade.)
3. Avkrysset for at soverom er i kjeller eller i sokkel og med minimum en yttervegg under terreng (anses å være en høy riskofaktor for fuktskade).

Punkt 1 og 3 avdekkes ved bruk av spørreskjema bolig-/innemiljø mens punkt 2 avdekkes ved samtale med den gravide.

Ved oppfyllelse av 1 eller 2 eller 3 skal det gis tilbud om inspeksjon av byggeteknisk sakkyndig for å undersøke om bad, kjeller eller soverom har fuktskader som må utbedres samt gi råd om utbedringstiltak. Hver fjerde av disse boligene vil i tillegg få tilbud om målinger.

Litteratur inneklima

1. Faktarapport til handlingsplan. Faktarapport om forebygging av astma, allergi og inneklimasykdommer. Sosial- og Helsedepartementet. (I-0933 B)
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3. Sporik R., Chapman MD., Platts-Mills TAE. House dust mite exposure as a cause of asthma. Clin. Exp. Allergy. 1992; 22:897-906
4. Peat JK., Tovey E., Toelle BG. et al. House dust mite allergens; a major risk factor for childhood asthma in Australia. Am J. Respir. Crit. care Med. 1996; 153:141-146.
5. Custovic A., Smith A., Woocock A.. Indoor allergens are a primary cause of asthma. Eur. Resp. Rev. 1998; 53:155-158.

PROSEDYRE I SVANGERSKAPET

Inklusjonen bør skje så tidlig som mulig i svangerskapet

- Ved første konsultasjon hos lege (oftest 8.-12.uke) eller hvis første konsultasjon er hos jordmor, bør prosjektet presenteres for den gravide i form av informasjons-brosjyren "Til deg som er gravid" og "Samtykkeerklæring". Samtidig informeres kort om Barneallergistudien.
- Etter at samtykke er underskrevet deles spørreskjema ut, og fylles helst ut med det samme.
- Den første informasjonen/intervensjonen gis i forbindelse med konsultasjonen hos legen, gjerne med støtte i utfylt spørre-skjema hvis det er gjort.

Brosjyrematerialе deles ut og det sørges for

1. Kostinformasjon; med veiledning i øket inntak av fisk/omega-3-fettsyrer, gis til alle.
2. Boliginformasjon: Veiledning i daglige rutiner for å redusere fuktekspositsjon/ fuktskader. Ved mistanke om fuktskader, henvises den gravide til Trondheim kommunes klimatelefon: **72 54 70 58**
3. Røykeinformasjon: Hvis den gravide eller partner røyker: Informer om det tilbudet de får i prosjektet og motiver til røyke-slutt. Hvis den gravide er motivert startes intervensjonen straks, evt. med tilbud om umiddelbart røykeavvenningskurs. Alterna-tivt forsøkes det å lage en avtale om å komme tilbake til temaet ved neste kontroll.

Senere kontroller

- Dersom spørreskjema ikke ble utfylt ved første svangerskapskontroll tar den gravide skjemaet med ved neste kontroll.
  Gå gjennom spørreskjemaet med den gravide og fortsett intervensjonen på bakgrunn av de opplysninger spørre-skjemaet gir om kost, inneklima og røyking.
- Inngåtte avtaler følges opp, og det samtales om de endringer som har skjedd.
- Skjema for registrering av røykeadferd for røykerne fylles ut, og tilbud om røyke-avvenning for de som ikke har sluttet følges opp.

I hele svangerskapet

Sørg for at intervensjonark alltid følger helsekortet.

Ved spørsmål om intervensjonstemaene:

Røykeavvenning: kontakt Byåsen helsestasjon.
Tlf:
Fax:
e-post:

Kosthold: kontakt Charlottenlund helsestasjon.
Tlf:
Fax:
e-post:

Inneklima: kontakt Rosten helsestasjon.
Tlf:
Fax:
e-post:

PACT

Rosenborg Grafisk Kommunikasjon AS - R17955A1 – Foto:

Appendix 9

Information brochure and advice to pregnant women regarding the intervention topics in Norwegian

PACT

KILDE TIL MER INFORMASJON

Besøk vår Internettside:

www.pact.ntnu.no

Røykeavvenning

www.helsenett.no
www.tobakk.no

Kost

www.sef.no

www.dinkost.no

www.helsenytt.no/artikler/gravideskost.htm

Inneklima

www.inneklima.com

www.innemiljo.net

PACT

Rosenborg Grafisk Kommunikasjon AS - R17954A1 – Foto:

Til deg som er

GRAVID

Hvordan kan du

styrke

ditt

barns

forsvar

mot

allergisk

sykdom?

BARNEALLERGI STUDIEN I TRONDHEIM

PREVENTION OF ATOPY AMONG CHILDREN IN TRONDHEIM.

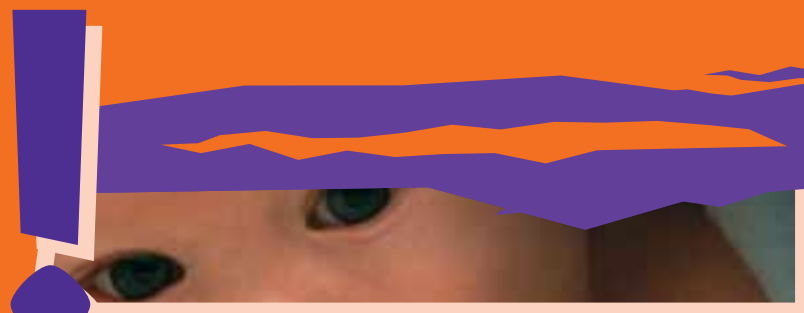
NTNU Norges teknisk-naturvitenskapelige universitet

SINTEF Unimed

TRONDHEIM KOMMUNE

PACT

RØYKING UNDER SVANGERSKAPET PÅVIRKER **BARNET**



Hvordan påvirker røyking fosteret?

Det meste av det du puster inn, når frem til fosteret gjennom morkaken. Det gjelder både nyttige og skadelige stoffer. Kullosen fra sigarettrøyken fortrenger oksygenet fra de røde blodlegemene og gjør at fosteret hele tiden lider av litt surstoffmangel. Nikotinet i tobakken gjør at blodårene trekker seg sammen så barnet får dårligere blodtilførsel. Disse, og mange andre stoffer i røyken, gjør at barnet ditt blir dårligere rustet til å tåle påkjenninger.

Hva kan skje med fosteret?

Det er flere tilfeller av abort og dødfødsler blant røykere, og barna blir ofte litt mindre og har trangere luftveier. De er generelt litt svakere og har oftere umodne lunger.

Kan barnet skades på lengre sikt hvis jeg har røykt under graviditeten?

Flere undersøkelser tyder på at barn av røykere kan henge litt etter i vekst. Risikoen for kreft ser også ut til å øke litt hos dem som har vært utsatt for stoffer fra røyk som foster. Det er også større fare for krybbedød hvis du røyker gjennom hele svangerskapet.

Er det for sent å slutte når jeg allerede har vært gravid en stund?

Det er aldri for sent å slutte. Dersom du kutter ut røyken helt før 4. måned, er det vanskelig å finne alvorlige skader hos barnet senere. Til og med om du slutter bare noen uker eller dager før fødselen, så hjelper du barnet.

Er det bedre å røyke light-sigaretter?

Light-sigaretter er like skadelige som vanlige sigaretter, både fordi du røyker flere sigaretter og inhalerer kraftigere for å oppnå samme virkning.

Er det ikke nok å redusere røykingen – må jeg slutte helt?

Det er bedre å røyke lite enn å røyke mye. Bestem deg for en dag du skal slutte helt!

Hvordan kan mannen min hjelpe meg til å stumpe røyken?

Hvis han er ikke-røyker, så be ham om å støtte og hjelpe deg uten å kritisere. Hvis han selv er røyker, er det bra om dere slutter samtidig. Da kan dere oppmuntre hverandre, og det blir lettere for deg å slutte. Passiv røyking er heller ikke bra for deg under graviditeten, og ikke for barnet etter at det er født.

Hvordan kan røyking påvirke amming?

Røykere har vanskeligere for å få i gang melkeproduksjonen enn ikke-røykere. De må derfor sette seg oftere med barnet til brystet. Som røyker får du nemlig mindre av hormonet prolaktin som regulerer melkemengden. Helseskadelige stoffer i tobakk overføres via melken til barnet. Tobakk reduserer melkeproduksjonen.

Kan jeg begynne å røyke igjen når jeg er ferdig både med graviditet og amming?

Alle barn plages av tobakksrøyk i rommet. De blir oftere forkjølet og får lettere ørebetennelse, lungebetennelse, bronkitt og astma. Barn og røyking hører ikke sammen. Tenk også på gevinsten for deg selv: Du får bedre helse, penere hud, mindre rynker og god luktesans. Dertil sparer du mange penger som kan brukes til noe hyggelig.

Hvordan kan jeg få hjelp til å slutte med røykingen?

Be om hjelp og oppfølging hos lege eller jordmor. Du og din ektefelle/samboer kan melde dere på kurs for røykeavvenning. Be om hjelp og oppfølging av helsesøster etter fødselen.

Sats på et røykfritt hjem!

Røyk ute, om du absolutt må røyke.

Ønsker dere å være med på røykeavvenningskurs?

Ring: **72 55 96 75**

SPIS FEIT FISK MINST **TO GANGER UKENTLIG** NÅR DU ER GRAVID

Kan jeg forebygge allergisk sykdom hos barnet ved å innta omega-3 fettsyrer under svangerskapet?

Vi vet at inntak av omega-3 fettsyrer forebygger astma hos eldre barn.Vi tror at barnets risiko for å utvikle astma reduseres om du som mor passer på å innta omega-3 fettsyrer under svangerskapet. Gjennom Barneallergistudien i Trondheim skal vi finne ut mer om dette.

Hvilken mat inneholder omega-3 fettsyrer?

Vi anbefaler at du spiser minst to måltid med feit fisk ukentlig (laks, ørret, sild, makrell, uer og kveite). Dagsbehovet av omega-3 dekkes av: 50g laks, 115g (høst)/30g (vår) makrell, 30g makrell i tomat, 25g sild, 500g torsk, 330g reke.

Statens næringsmiddeltilsyn fraråder gravide og ammende å spise visse ferskvannsfisk (gjedde, abbor over 25cm, ørret over 1 kg og røye over 1 kg) ut fra at de kan inneholde kvikksølv. Oppdrettsfisk og sjøørret kan trygt spises.

I tillegg anbefales 5 ml (en spiseskje) tran daglig under hele svangerskapet

Bør jeg unngå et ensidig kosthold når jeg er gravid?

Ja, spis variert kost. Følg i tillegg legenes råd om ekstra tilskudd av folinsyre (tabletter) fra før svangerskapet til 3. måned i svangerskapet. Dette for å forebygge ryggmargsbrokk hos barnet.

Er det noen typer mat jeg bør unngå for å forhindre at barnet utvikler allergier?

Nei. En streng diett uten allergifremkallende mat (egg, fisk, erter, nøtter, skalldyr) under svangerskapet reduserer ikke risikoen for at barnet utvikler allergi. Kostrestriksjoner i svangerskapet er heller ikke nødvendig selv om du eller barnefaren har allergi eller dere tidligere har fått barn med allergisk sykdom.

Sats på to måltider med fet fisk per uke og regelmessig tran!

OPPSKRIFTER

Tunfisksalat

1 boks tunfisk i olje, Litt rødløk
1 stor tomat, 1 ts sitronsaft, salt & pepepr

Godt brød, philadelfiaost, tunfisksalat over, med fersk, basilikum på toppen. Mmmmm.

Makrell i tomat

Makrell i tomat med majones og agurk

Laks, råstekte poteter og tomatsalat

500 g urtemarienert laksefilet
Mandelpoteter i båter m/skall legges i langpanne smurt med olivenolje provencekrydder-tørket, salt/pepper
Laksefileten legges i i folie m/ salt & pepper, Legg dette sammen med potetene.

Bakes i steikovnen ved 200 C, 25 min

Salat:

En kurv cherry tomater - del tomatene i to
1 avokado i biter; litt feta ost

Dressing:

1 ts fransk sennep, 1 ts sukker, litt balsamico eddikk, litt olivenolje, salt & pepper

Ønsker dere å være med på matlagningskurs?
Ring:

EN BOLIG UTEN FUKTPROBLEM GIR **BARNET** EN GOD START

Hva betyr fuktproblem i boligen for helsa?

Råte-, muggdannelse og lukt i huset kan oppstå når fukt trenger gjennom bygningsdeler utenfra eller innenfra, eller når fukt fra byggefasen ikke har fått tid til å tørke ut før konstruksjonen lukkes.

En bolig uten fuktproblem forebygger plager som, hyppige forkjølelser, allergiske plager og astma for deg og barnet.

Hvordan er boligkonstruksjonen beskyttet mot fukt?

Over terrenget brukes plastfolie som fuktsikring i trekonstruksjoner på innsiden av isolasjonen. Under terrenget skal det ikke benyttes plastfolie fordi veggen skal ha mulighet til å tørke ut innover. Utvendig tetning av vegger er som oftest luftet kledning og en vindsperre.

Hvor er boligen mest utsatt for fuktskader?

På bad i dusjhjørner og ved badekar hvor det dusjes og det blir søl av vann på vegg og gulv. Vannsøl direkte på flis er risikobetont. Vann trenger inn i sprekker i flisfuger og inn bak flisen. Ved feil på membran eller hvis membran mangler helt, trenger vannet inn i vegg eller gulv og det blir fuktskader.

I kjeller ved f.eks. svikt i drenering. Rundt vindu og yttertak dersom det er utettheter

Hva kan skje dersom boligen har dårlig isolerte yttervegger?

Det kan bli kondens på innvendige flater vinterstid pga. høy luftfuktighet og kalde innvendige flater. Dette gjelder spesielt bak gjenstander med stor flate eller skap plassert mot yttervegg.

Hva kan jeg gjøre for å unngå fuktskader?

- Se til at takrenner, nedløpsrør etc. ikke tettes av løv og mose.
- Inspiser kryperom, kaldt loft og kjeller for synlige fuktskader og yttertak for synlige utettheter vår og høst.
- Rens baderomssluk for hår og sand minst en gang pr. år.
- Undersøk årsak til synlig muggvekst på innvendige flater og utbedre raskest mulig.

Hva er det ved innemiljøet som kan gi allergisk sykdom?

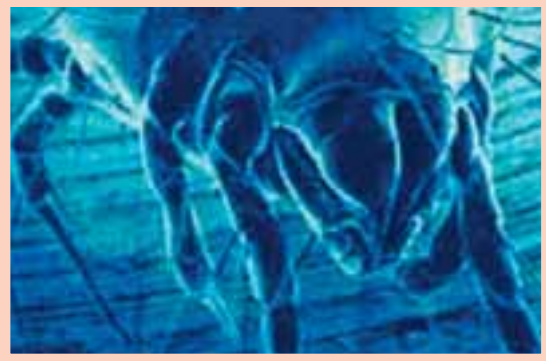
Høye konsentrasjoner av husstøvmidd og muggsopp øker risikoen for at barn og voksne kan få allergiproblemer.

Avføring fra midd og sporer fra muggsopp innholder nemlig stoffer som kan framkalle allergi.

Midd trives i senger og teppegulv. Den lever av flass fra huden. Midd legger egg i madrassen og på sengebunnen.

Muggsopp trives i boligen på steder med steder med kondens og fuktkilder. Den lever av og på bygningsmaterialer og lager sporer som spres i innelufta.

Hvordan kan jeg unngå middproblemer på soverom?



- Unngå heldekkende tepper, og overlesse rommet med leker og kosedyr, slik at det blir enklere å rengjøre rommet.
- Veggventilene bør være åpne hele tiden.
- Luft madrassen ved å ta til siden dynen om morgenen.
- Unngå at damp fra dusj, koking, klestørking og liknende når soverommet.
- Skifte og vask av laken, putevar og dyne trekk minst hver andre uke.
- Støvsug madrass, overmadrass, seng og sengebunn minst hver andre måned.

Hvordan kan jeg unngå muggsopproblem i boligen?

- Stans all uønsket fukttilgang.
- Fjern alt fuktskadet materiale.
- Hold det tørt og rent.

Ha godt avtrekk i rom med fuktkilder, gjerne elektrisk vifte i ventil i yttervegg eller sjakt på våtrom.

Hvordan bør jeg bruke boligen?

- Hold lufttemperaturen i oppholdsrom på 20-22°C om vinteren.
- Luft godt ved å åpne dører og vinduer i 3-5 minutter flere ganger daglig.
- Slipp frisk uteluft inn gjennom ventilene i ytterveggene.
- La den brukte, dårlige lufta få slippe ut gjennom ventiler i tak på bad, WC og andre våtrom.

Når bør barnets soverom være ferdig oppusset?

Alle arbeider bør være ferdig minimum tre uker før rommet tas i bruk av barnet. Rommet bør i denne perioden ha normal ”stuetemperatur” eller helst litt varmere slik at avgassing fra maling og nye materialer kan skje raskere. Ny madrass bør også ligge utpakket minst en uke før den tas i bruk av barnet.

Har du pørsmål om inneklima?
Ring Trondheim kommunes inneklimatelefon: **72 54 70 58**

Appendix 10

Information brochure and advice to parents regarding the intervention topics
in Norwegian

PACT

KILDE TIL MER INFORMASJON

- **Besøk vår Internettside:**
  www.pact.ntnu.no
- **Røykeavvenning**
  www.tobakk.no
  www.helsenett.no
- **Kost**
  www.sef.no
  www.dinkost.no
  www.helsenytt.no/artikler/barneskost.htm
  www.snt.no
- **Inneklima**
  www.inneklima.com
  www.innemiljo.net
  www.be.no/beweb/info/hh/hhinfo.html

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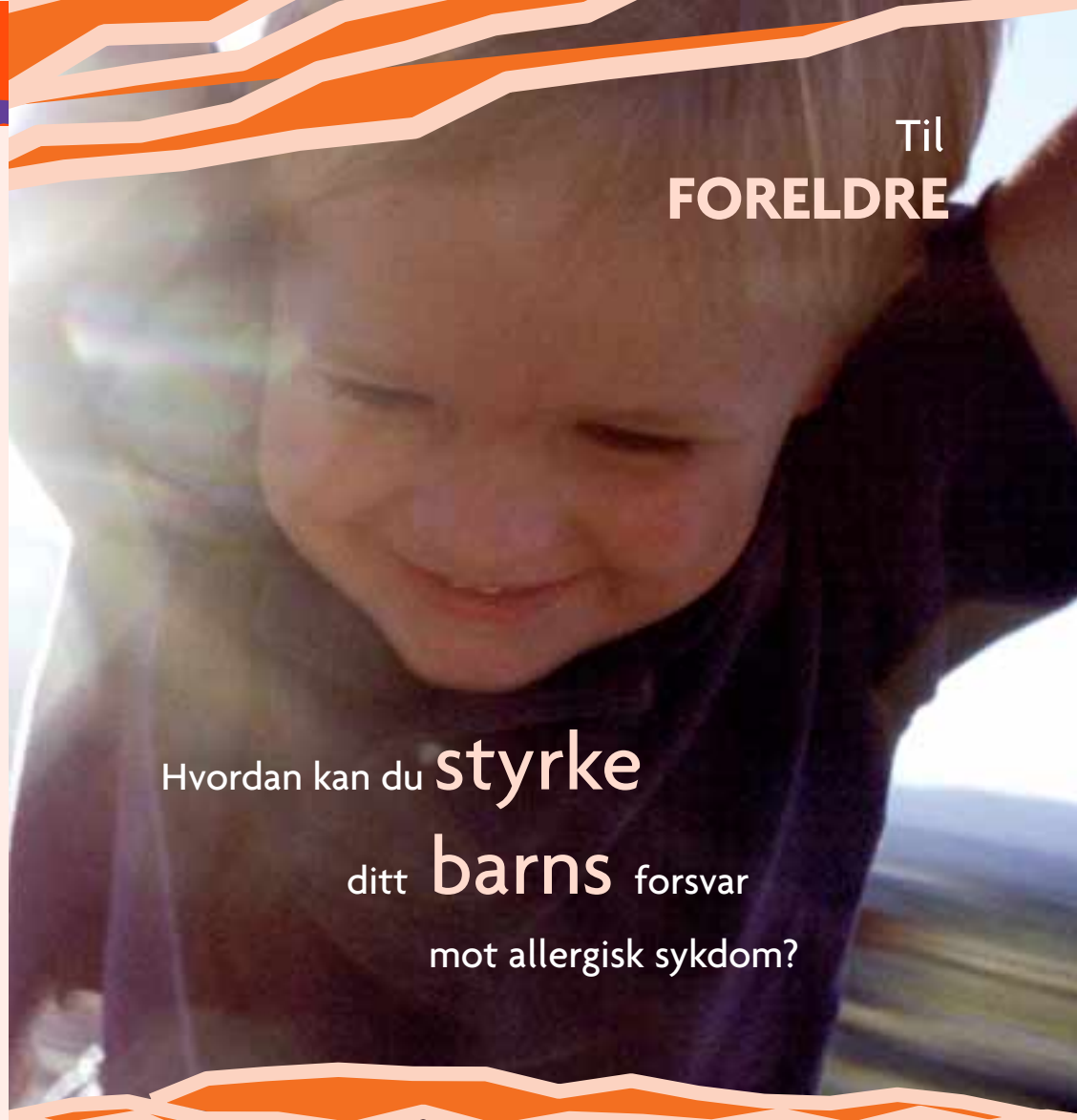

Til
FORELDRE

Hvordan kan du **styrke** ditt **barns** forsvar mot allergisk sykdom?

RØYKING, KOSTHOLD OG INNEKLIMA

BARNEALLERGISTUDIEN I TRONDHEIM

PREVENTION OF ATOPY AMONG CHILDREN IN TRONDHEIM

NTNU Norges teknisk-naturvitenskapelige universitet
SINTEF Unimed
TRONDHEIM KOMMUNE

PACT

RØYKING PÅVIRKER BARNET

Røyking under amming

Nå kan det vel ikke være så farlig om jeg begynner å røyke igjen, nå som barnet er født?

Prøv for all del å ikke begynne igjen. Røyking mens du ammer har lett for å gi dårligere melk og mindre melkemengde.

Hvorfor blir det mindre melk når jeg røyker?

En av grunnene kan være at røykere ofte produsere litt mindre av det hormonet som styrer melkemengden, prolaktin. Andre virkninger røyken har på din egen kropp er nok heller ikke bra for melkemengden. I tillegg ser det ut til at en del røykere bruker noe mindre tid på å amme pr. døgn, slik at brystene ikke blir godt nok stimulert.

Hvorfor blir melken dårligere hvis jeg røyker?

Mange av de rundt 4000 stoffene fra sigarettene, f.eks. kullos, blåsyre og tjære, passerer over i melken. Nikotin er det som er best undersøkt. Nikotinet går spesielt lett over i melken, slik at konsentrasjonen i morens melk er høyere enn i blodet hennes.

Hvordan virker det på barnet mitt?

Barn av røykende kvinner som ammer har lettere for å få kolikk. De skriker gjerne mer, er uroligere og legger ofte ikke på seg så mye som barna til kvinner som ikke røyker.

Da er det vel best at jeg ikke ammer barnet mitt siden jeg røyker?

Nei, ut fra det vi vet i dag mener ekspertene at morsmelken er så verdifull for barnet ditt at du bør fortsette å amme selv om du ikke klarer helt å slutte.

Jeg har nesten klart å kutte ut røyken. Når er det minst skadelig for barnet at jeg røyker?

Nikotinkonsentrasjonen er på topp i melken like etter at du har røykt. Derfor bør du først amme, så ta en røyk - eller helst bare en halv - hvis du ikke kan unnvære den, og så ikke røyke noe mer før etter neste gang du har ammet.

Kan jeg bruke nikotintyggegummi når jeg ammer?

Du får jo nikotin i melken da også, derfor anbefales det vanligvis ikke til kvinner som ammer. Det er likevel bedre enn å røyke, fordi du unngår alle de andre stoffene som er i sigarettrøyk.

Er det noen fordeler for meg selv ved å slutte å røyke?

Det som raskt blir merkbart er at du unngår vond lukt fra munnen og generelt blir friskere og sunnere. Du får også mindre rynkete hud som ikke-røyker. Det viktigste er likevel at du reduserer risikoen både for akutte og kroniske sykdommer som skyldes røyking. Du får ikke så lett luftveisinfeksjoner som forkjølelse, bihulebetennelse, bronkitt og lungebetennelse, og forebygger KOLS (Kronisk lungesykdom). På litt lengre sikt reduserer du risikoen for hjerteinfarkt og slag, samt flere farlige kreftformer. Og du sparer store summer på å slutte å røyke: Dersom f.eks. et par røyker 20 sigaretter hver om dagen med litt ekstra i helgene, betyr røykeslutt over 100 000 kroner spart i løpet av 3 år.

Barn og passiv røyking

Å røyke passivt vil si at man puster inn luft som er forurenset av tobakksrøyk. Ved passiv røyking utsettes man for de samme stoffene som ved aktiv røyking, og kan få i seg like mye av de helseskadelige stoffene som om man hadde røykt flere sigaretter selv.

Passiv røyking er spesielt skadelig for små barn. Tobakksrøyk gjør at lungene fungerer dårligere, og at slimhinnene i luftveiene blir mer mottakelige for infeksjoner. Barn som vokser opp i et røykfylt innemiljø, får derfor mer luftveisinfeksjoner som bronkitt og lungebetennelse, og gjentatte ørebetennelser.

Langvarig passiv røyking øker i tillegg risikoen for kroniske luftveissymptomer. Barn som kommer fra hjem hvor foreldrene røyker, har økt forekomst av astma. I tillegg vil passiv røyking øke hyppigheten og alvorlighetsgraden av astmaanfall hos barn som allerede har sykdommen.

Kilde: Overlege Dr. med. Gro Nylander, *Rikshospitalet*

Sats på et røykfritt hjem!

Ønsker dere å være med på røykesluttkurs?
Byåsen helsestasjon
Ring: **72 54 54 30**

SPIS FEIT FISK MINST **TO GANGER UKENTLIG** OG TA TRAN DAGLIG

Kan allergisk sykdom hos barnet forebygges ved at mor under ammeperioden inntar omega-3 fettsyrer?

Vi vet at mors inntak av omega-3 fettsyrer påvirker innholdet i morsmelk, og at omega-3 fettsyrer forebygger astma hos barn. Dette skal vi undersøke i studien.

Går omega-3 fettsyrer over i morsmelken?

Mors inntak av omega-3 fettsyrer påvirker innholdet i morsmelk. Mor anbefales under amming å ta 5ml tran daglig og spise fet fisk minst to ganger ukentlig som middagsmat eller pålegg.

Hvilke matvarer inneholder omega-3 fettsyrer?

De viktigste kildene til omega-fettsyrer er fet fisk og tran. Dagsbehovet for omega-3 fettsyrer dekkes av: 25 g sild, 30g makrell i tomat, 50g laks, 200 g kveite. Oppdrettsfisk og sjøørret kan trygt spises. Ammende frarådes å spise visse ferskvannsfisk (gjedde, abbor over 25 cm, ørret og røye over 1 kg) ut fra at de kan inneholde kvikksølv.

Når kan barnet gis tran og fet fisk?

Når barnet er fire uker kan det gis tran daglig. Start med noen dråper og øk til 5 ml - bruk målebeger. Når barnet er 6 måneder gis det middagsmat eller pålegg to ganger ukentlig i tillegg til tran. Start med små porsjoner og øk gradvis.

Eksempel på middagsmat (1dl)

1 potet, ca 30g grønnsaker (f.eks. 1/2 gulrot), vann til å koke i, 20–30g fet fisk (f.eks. laks), 1/2–3/4 dl kraft, kokavann eller morsmelk til å mose maten i (eventuelt olje eller myk plantemargarin)

Tips:

- La poteter og grønnsaker koke til de er myke.
- Fisken må være gjennomkokt.
- Bruk lite kokevann til potet/grønnsaker og bruk det til å mose maten i.
- Bruk rivjern på frossen laks. Dampkok laksen i folie, bland den deretter med kokt, finmoset potet og grønnsaker.
- Middagsmaten kan mangedobles og fryses i posjoner.

Eksempel på pålegg

- Makrell i tomat og kaviarmix

Ønsker dere å være med på matlagningskurs?
Charlottenlund helsestasjon
Ring: **72 54 89 70**

EN BOLIG UTEN FUKTPROBLEM GIR **BARNET** EN GOD START

Hvordan er det for barnet å bo i bolig med fuktproblem

Å bo i bolig med fuktproblem er forbundet med økt risiko for å få gjentatte luftveisplager og astma. Hvis det er identifisert fuktskader eller boligen generelt er fuktig bør skaden saneres og ventilasjonen bedres. med enkle grep er det mulig å forebygge fuktproblem.

Hvordan bør jeg bruke boligen

- Hold lufttemperaturen på 20-22°C om vinteren.
- Luft godt ved å åpne dører og vinduer 3-5 minutter flere ganger daglig.
- Slipp frisk uteluft inn gjennom ventilene i ytterveggene.
- La den brukte, dårlige lufta få slippe ut gjennom ventiler i tak på bad. La bade-romsdøren stå litt på gløtt etter dusjing for å få raskere utluftingen av badet.

Egenkontroll av fuktproblem og ventilasjon i egen bolig?

- **Når du kommer inn i boligen oppleves lufta innestengt?**
  Åpne veggventiler og takventiler.
  Sjekk at avtrekksvifter virker.
- **Fjerner kjøkkenavtrekket matosen?**
  Vask filterrist, sjekk om spjeld stenger for avtrekket.
- **Er det fortsatt mye dugg på vindu på bad 4 timer etter dusjing eller på soverom om morgenen?**
  Sjekk at ventilene er åpne. Lufting kan også bedres ved å åpne dører og vindu.
- **Er det sprekker i flisfuger i dusjen?**
  Kan tyde på bevegelse pga fukt i vegg, bør undersøkes nærmere.
- **Renses sluk på våtrom 2 ganger i året?**
  Tett sluk kan gi vannskade i gulv.
- **Er det tegn til muggsopp eller kondens på kalde ytterveggsflater bak tunge møbler eller skap?**
  Tyder på dårlig isolert yttervegg, bør utredes. Unngå å plassere store gjenstander mot yttervegg.
- **Kommer det fukt inn ved gulv/ytter vegg i kjeller eller sokkel?**
  Tyder på mangelfull drenering, bør utredes.
- **Renses takrenner og nedløp både vår og høst?**
  Oppdemming eller gjentetting kan gi vannskader.

Hva er det ved innemiljøet som kan gi allergisk sykdom?

Høye konsentrasjoner av husstøvmidd og muggsopp øker risikoen for at barn og voksne kan få allergisk sykdom. Avføring fra midd og sporer fra muggsopp innholder stoffer som kan framkalle allergi.

Midd og muggsopp er avhengig av fukt for å trives.

Midd trives i senger og teppegulv. Den lever av flass fra huden. Midd legger egg i madrassen og på sengebunnen.

Muggsopp lager et trådlignende nettverk i og på bygningsmaterialer. Den danner sporer som spres i innelufta.

Hvordan kan jeg forebygge middproblem på soverom?

- Unngå heldekkende tepper.
- Luft gjennom vinduet, ytterveggsventil og la soveromsdøren stå på gløtt.
- Luft madrassen ved å ta til siden dynen hver morgenen.
- Unngå at damp fra dusj, koking og klestørking når soverommet.
- Skift og vask laken, putevar og dyne-trekk minst hver andre uke.
- Støvsug madrass, overmadrass, seng og sengebunn grunding minst hver andre måned, noe oftere sommer og høst. Bruk sentralstøvsuger eller støvsuger med hepafilter.

Hvordan kan jeg forebygge muggsopproblem i boligen?

- Hold det tørt og rent.
- Oppstår uønsket fukttilgang, finn årsak og gjør utbedringstiltak snarest mulig.
- Har boligen vært utsatt for fuktskade, fjern alle fuktskadede, porøse materialer snarest mulig.
- Ha godt avtrekk i rom med fuktkilder, gjerne elektrisk avtrekksvifte.

Barnets soverom

- Hold lufttemperaturen på 15–18°C om vinteren.
- Hold det ryddig, ikke overless rommet med tekstiler, kosedyr og leker. Dette letter også rengjøring av rommet.
- Barnets soverom bør ikke tas i bruk før minimum tre uker etter at malearbeidene var ferdig. Rommet bør ha minimum stuetemperatur og luftes godt i disse 3 ukene.
- Ny madrass bør ligge utpakket en uke før den tas i bruk.

Har du pørsmål om inneklima? Ring Trondheim kommunes inneklimatelefon: **72 54 70 58**

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121. Rune Haaverstad: OEDEMA FORMATION OF THE LOWER EXTREMITIES.
122. Magne Børset: THE ROLE OF CYTOKINES IN MULTIPLE MYELOMA, WITH SPECIAL REFERENCE TO HEPATOCYTE GROWTH FACTOR.
123. Geir Smedslund: A THEORETICAL AND EMPIRICAL INVESTIGATION OF SMOKING, STRESS AND DISEASE: RESULTS FROM A POPULATION SURVEY.

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124. Torstein Vik: GROWTH, MORBIDITY, AND PSYCHOMOTOR DEVELOPMENT IN INFANTS WHO WERE GROWTH RETARDED *IN UTERO*.
125. Siri Forsmo: ASPECTS AND CONSEQUENCES OF OPPORTUNISTIC SCREENING FOR CERVICAL CANCER. Results based on data from three Norwegian counties.
126. Jon S. Skranes: CEREBRAL MRI AND NEURODEVELOPMENTAL OUTCOME IN VERY LOW BIRTH WEIGHT (VLBW) CHILDREN. A follow-up study of a geographically based year cohort of VLBW children at ages one and six years.
127. Knut Bjørnstad: COMPUTERIZED ECHOCARDIOGRAPHY FOR EVALUTION OF CORONARY ARTERY DISEASE.
128. Grethe Elisabeth Borchgrevink: DIAGNOSIS AND TREATMENT OF WHIPLASH/NECK SPRAIN INJURIES CAUSED BY CAR ACCIDENTS.
129. Tor Elsås: NEUROPEPTIDES AND NITRIC OXIDE SYNTHASE IN OCULAR AUTONOMIC AND SENSORY NERVES.
130. Rolf W. Gråwe: EPIDEMIOLOGICAL AND NEUROPSYCHOLOGICAL PERSPECTIVES ON SCHIZOPHRENIA.
131. Tonje Strømholm: CEREBRAL HAEMODYNAMICS DURING THORACIC AORTIC CROSSCLAMPING. An experimental study in pigs.

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132. Martinus Bråten: STUDIES ON SOME PROBLEMS REALTED TO INTRAMEDULLARY NAILING OF FEMORAL FRACTURES.
133. Ståle Nordgård: PROLIFERATIVE ACTIVITY AND DNA CONTENT AS PROGNOSTIC INDICATORS IN ADENOID CYSTIC CARCINOMA OF THE HEAD AND NECK.

134. Egil Lien: SOLUBLE RECEPTORS FOR **TNF** AND **LPS**: RELEASE PATTERN AND POSSIBLE SIGNIFICANCE IN DISEASE.
135. Marit Bjørgaas: HYPOGLYCAEMIA IN CHILDREN WITH DIABETES MELLITUS
136. Frank Skorpen: GENETIC AND FUNCTIONAL ANALYSES OF DNA REPAIR IN HUMAN CELLS.
137. Juan A. Pareja: SUNCT SYNDROME. ON THE CLINICAL PICTURE. ITS DISTINCTION FROM OTHER, SIMILAR HEADACHES.
138. Anders Angelsen: NEUROENDOCRINE CELLS IN HUMAN PROSTATIC CARCINOMAS AND THE PROSTATIC COMPLEX OF RAT, GUINEA PIG, CAT AND DOG.
139. Fabio Antonaci: CHRONIC PAROXYSMAL HEMICRANIA AND HEMICRANIA CONTINUA: TWO DIFFERENT ENTITIES?
140. Sven M. Carlsen: ENDOCRINE AND METABOLIC EFFECTS OF METFORMIN WITH SPECIAL EMPHASIS ON CARDIOVASCULAR RISK FACTORES.

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141. Terje A. Murberg: DEPRESSIVE SYMPTOMS AND COPING AMONG PATIENTS WITH CONGESTIVE HEART FAILURE.
142. Harm-Gerd Karl Blaas: THE EMBRYONIC EXAMINATION. Ultrasound studies on the development of the human embryo.
143. Noèmi Becser Andersen:THE CEPHALIC SENSORY NERVES IN UNILATERAL HEADACHES. Anatomical background and neurophysiological evaluation.
144. Eli-Janne Fiskerstrand: LASER TREATMENT OF PORT WINE STAINS. A study of the efficacy and limitations of the pulsed dye laser. Clinical and morfological analyses aimed at improving the therapeutic outcome.
145. Bård Kulseng: A STUDY OF ALGINATE CAPSULE PROPERTIES AND CYTOKINES IN RELATION TO INSULIN DEPENDENT DIABETES MELLITUS.
146. Terje Haug: STRUCTURE AND REGULATION OF THE HUMAN UNG GENE ENCODING URACIL-DNA GLYCOSYLASE.
147. Heidi Brurok: MANGANESE AND THE HEART. A Magic Metal with Diagnostic and Therapeutic Possibilites.
148. Agnes Kathrine Lie: DIAGNOSIS AND PREVALENCE OF HUMAN PAPILLOMAVIRUS INFECTION IN CERVICAL INTRAEPITELIAL NEOPLASIA. Relationship to Cell Cycle Regulatory Proteins and HLA DQBI Genes.
149. Ronald Mårvik: PHARMACOLOGICAL, PHYSIOLOGICAL AND PATHOPHYSIOLOGICAL STUDIES ON ISOLATED STOMACS.
150. Ketil Jarl Holen: THE ROLE OF ULTRASONOGRAPHY IN THE DIAGNOSIS AND TREATMENT OF HIP DYSPLASIA IN NEWBORNS.
151. Irene Hetlevik: THE ROLE OF CLINICAL GUIDELINES IN CARDIOVASCULAR RISK INTERVENTION IN GENERAL PRACTICE.
152. Katarina Tunòn: ULTRASOUND AND PREDICTION OF GESTATIONAL AGE.
153. Johannes Soma: INTERACTION BETWEEN THE LEFT VENTRICLE AND THE SYSTEMIC ARTERIES.
154. Arild Aamodt: DEVELOPMENT AND PRE-CLINICAL EVALUATION OF A CUSTOM-MADE FEMORAL STEM.
155. Agnar Tegnander: DIAGNOSIS AND FOLLOW-UP OF CHILDREN WITH SUSPECTED OR KNOWN HIP DYSPLASIA.
156. Bent Indredavik: STROKE UNIT TREATMENT: SHORT AND LONG-TERM EFFECTS
157. Jolanta Vanagaite Vingen: PHOTOPHOBIA AND PHONOPHOBIA IN PRIMARY HEADACHES

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158. Ola Dalsegg Sæther: PATHOPHYSIOLOGY DURING PROXIMAL AORTIC CROSS-CLAMPING CLINICAL AND EXPERIMENTAL STUDIES
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160. Christina Vogt Isaksen: PRENATAL ULTRASOUND AND POSTMORTEM FINDINGS – A TEN YEAR CORRELATIVE STUDY OF FETUSES AND INFANTS WITH DEVELOPMENTAL ANOMALIES.
161. Holger Seidel: HIGH-DOSE METHOTREXATE THERAPY IN CHILDREN WITH ACUTE LYMPHOCYTIC LEUKEMIA: DOSE, CONCENTRATION, AND EFFECT CONSIDERATIONS.
162. Stein Hallan: IMPLEMENTATION OF MODERN MEDICAL DECISION ANALYSIS INTO CLINICAL DIAGNOSIS AND TREATMENT.

163. Malcolm Sue-Chu: INVASIVE AND NON-INVASIVE STUDIES IN CROSS-COUNTRY SKIERS WITH ASTHMA-LIKE SYMPTOMS.
164. Ole-Lars Brekke: EFFECTS OF ANTIOXIDANTS AND FATTY ACIDS ON TUMOR NECROSIS FACTOR-INDUCED CYTOTOXICITY.
165. Jan Lundbom: AORTOCORONARY BYPASS SURGERY: CLINICAL ASPECTS, COST CONSIDERATIONS AND WORKING ABILITY.
166. John-Anker Zwart: LUMBAR NERVE ROOT COMPRESSION, BIOCHEMICAL AND NEUROPHYSIOLOGICAL ASPECTS.
167. Geir Falck: HYPEROSMOLALITY AND THE HEART.
168. Eirik Skogvoll: CARDIAC ARREST Incidence, Intervention and Outcome.
169. Dalius Bansevicius: SHOULDER-NECK REGION IN CERTAIN HEADACHES AND CHRONIC PAIN SYNDROMES.
170. Bettina Kinge: REFRACTIVE ERRORS AND BIOMETRIC CHANGES AMONG UNIVERSITY STUDENTS IN NORWAY.
171. Gunnar Qvigstad: CONSEQUENCES OF HYPERGASTRINEMIA IN MAN
172. Hanne Ellekjær: EPIDEMIOLOGICAL STUDIES OF STROKE IN A NORWEGIAN POPULATION. INCIDENCE, RISK FACTORS AND PROGNOSIS
173. Hilde Grimstad: VIOLENCE AGAINST WOMEN AND PREGNANCY OUTCOME.
174. Astrid Hjelde: SURFACE TENSION AND COMPLEMENT ACTIVATION: Factors influencing bubble formation and bubble effects after decompression.
175. Kjell A. Kvistad: MR IN BREAST CANCER – A CLINICAL STUDY.
176. Ivar Rossvoll: ELECTIVE ORTHOPAEDIC SURGERY IN A DEFINED POPULATION. Studies on demand, waiting time for treatment and incapacity for work.
177. Carina Seidel: PROGNOSTIC VALUE AND BIOLOGICAL EFFECTS OF HEPATOCYTE GROWTH FACTOR AND SYNDECAN-1 IN MULTIPLE MYELOMA.

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178. Alexander Wahba: THE INFLUENCE OF CARDIOPULMONARY BYPASS ON PLATELET FUNCTION AND BLOOD COAGULATION – DETERMINANTS AND CLINICAL CONSEQUENSES
179. Marcus Schmitt-Egenolf: THE RELEVANCE OF THE MAJOR hISTOCOMPATIBILITY COMPLEX FOR THE GENETICS OF PSORIASIS
180. Odrun Arna Gederaas: BIOLOGICAL MECHANISMS INVOLVED IN 5-AMINOLEVULINIC ACID BASED PHOTODYNAMIC THERAPY
181. Pål Richard Romundstad: CANCER INCIDENCE AMONG NORWEGIAN ALUMINIUM WORKERS
182. Henrik Hjorth-Hansen: NOVEL CYTOKINES IN GROWTH CONTROL AND BONE DISEASE OF MULTIPLE MYELOMA
183. Gunnar Morken: SEASONAL VARIATION OF HUMAN MOOD AND BEHAVIOUR
184. Bjørn Olav Haugen: MEASUREMENT OF CARDIAC OUTPUT AND STUDIES OF VELOCITY PROFILES IN AORTIC AND MITRAL FLOW USING TWO- AND THREE-DIMENSIONAL COLOUR FLOW IMAGING
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186. Knut Ivar Aasarød: RENAL INVOLVEMENT IN INFLAMMATORY RHEUMATIC DISEASE. A Study of Renal Disease in Wegener's Granulomatosis and in Primary Sjögren's Syndrome
187. Trude Helen Flo: RESEPTORS INVOLVED IN CELL ACTIVATION BY DEFINED URONIC ACID POLYMERS AND BACTERIAL COMPONENTS
188. Bodil Kavli: HUMAN URACIL-DNA GLYCOSYLASES FROM THE UNG GENE: STRUCTRUAL BASIS FOR SUBSTRATE SPECIFICITY AND REPAIR
189. Liv Thommesen: MOLECULAR MECHANISMS INVOLVED IN TNF- AND GASTRIN-MEDIATED GENE REGULATION
190. Turid Lingaas Holmen: SMOKING AND HEALTH IN ADOLESCENCE; THE NORD-TRØNDELAG HEALTH STUDY, 1995-97
191. Øyvind Hjertner: MULTIPLE MYELOMA: INTERACTIONS BETWEEN MALIGNANT PLASMA CELLS AND THE BONE MICROENVIRONMENT
192. Asbjørn Støylen: STRAIN RATE IMAGING OF THE LEFT VENTRICLE BY ULTRASOUND. FEASIBILITY, CLINICAL VALIDATION AND PHYSIOLOGICAL ASPECTS

193. Kristian Midthjell: DIABETES IN ADULTS IN NORD-TRØNDELAG. PUBLIC HEALTH ASPECTS OF DIABETES MELLITUS IN A LARGE, NON-SELECTED NORWEGIAN POPULATION.
194. Guanglin Cui: FUNCTIONAL ASPECTS OF THE ECL CELL IN RODENTS
195. Ulrik Wisløff: CARDIAC EFFECTS OF AEROBIC ENDURANCE TRAINING: HYPERTROPHY, CONTRACTILITY AND CALCUIM HANDLING IN NORMAL AND FAILING HEART
196. Øyvind Halaas: MECHANISMS OF IMMUNOMODULATION AND CELL-MEDIATED CYTOTOXICITY INDUCED BY BACTERIAL PRODUCTS
197. Tore Amundsen: PERFUSION MR IMAGING IN THE DIAGNOSIS OF PULMONARY EMBOLISM
198. Nanna Kurtze: THE SIGNIFICANCE OF ANXIETY AND DEPRESSION IN FATIQUE AND PATTERNS OF PAIN AMONG INDIVIDUALS DIAGNOSED WITH FIBROMYALGIA: RELATIONS WITH QUALITY OF LIFE, FUNCTIONAL DISABILITY, LIFESTYLE, EMPLOYMENT STATUS, CO-MORBIDITY AND GENDER
199. Tom Ivar Lund Nilsen: PROSPECTIVE STUDIES OF CANCER RISK IN NORD-TRØNDELAG: THE HUNT STUDY. Associations with anthropometric, socioeconomic, and lifestyle risk factors
200. Asta Kristine Håberg: A NEW APPROACH TO THE STUDY OF MIDDLE CEREBRAL ARTERY OCCLUSION IN THE RAT USING MAGNETIC RESONANCE TECHNIQUES

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201. Knut Jørgen Arntzen: PREGNANCY AND CYTOKINES
202. Henrik Døllner: INFLAMMATORY MEDIATORS IN PERINATAL INFECTIONS
203. Asta Bye: LOW FAT, LOW LACTOSE DIET USED AS PROPHYLACTIC TREATMENT OF ACUTE INTESTINAL REACTIONS DURING PELVIC RADIOTHERAPY. A PROSPECTIVE RANDOMISED STUDY.
204. Sylvester Moyo: STUDIES ON STREPTOCOCCUS AGALACTIAE (GROUP B STREPTOCOCCUS) SURFACE-ANCHORED MARKERS WITH EMPHASIS ON STRAINS AND HUMAN SERA FROM ZIMBABWE.
205. Knut Hagen: HEAD-HUNT: THE EPIDEMIOLOGY OF HEADACHE IN NORD-TRØNDELAG
206. Li Lixin: ON THE REGULATION AND ROLE OF UNCOUPLING PROTEIN-2 IN INSULIN PRODUCING ß-CELLS
207. Anne Hildur Henriksen: SYMPTOMS OF ALLERGY AND ASTHMA VERSUS MARKERS OF LOWER AIRWAY INFLAMMATION AMONG ADOLESCENTS
208. Egil Andreas Fors: NON-MALIGNANT PAIN IN RELATION TO PSYCHOLOGICAL AND ENVIRONTENTAL FACTORS. EXPERIENTAL AND CLINICAL STUDES OF PAIN WITH FOCUS ON FIBROMYALGIA
209. Pål Klepstad: MORPHINE FOR CANCER PAIN
210. Ingunn Bakke: MECHANISMS AND CONSEQUENCES OF PEROXISOME PROLIFERATOR-INDUCED HYPERFUNCTION OF THE RAT GASTRIN PRODUCING CELL
211. Ingrid Susann Gribbestad: MAGNETIC RESONANCE IMAGING AND SPECTROSCOPY OF BREAST CANCER
212. Rønnaug Astri Ødegård: PREECLAMPSIA – MATERNAL RISK FACTORS AND FETAL GROWTH
213. Johan Haux: STUDIES ON CYTOTOXICITY INDUCED BY HUMAN NATURAL KILLER CELLS AND DIGITOXIN
214. Turid Suzanne Berg-Nielsen: PARENTING PRACTICES AND MENTALLY DISORDERED ADOLESCENTS
215. Astrid Rydning: BLOOD FLOW AS A PROTECTIVE FACTOR FOR THE STOMACH MUCOSA. AN EXPERIMENTAL STUDY ON THE ROLE OF MAST CELLS AND SENSORY AFFERENT NEURONS

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216. Jan Pål Loennechen: HEART FAILURE AFTER MYOCARDIAL INFARCTION. Regional Differences, Myocyte Function, Gene Expression, and Response to Cariporide, Losartan, and Exercise Training.
217. Elisabeth Qvigstad: EFFECTS OF FATTY ACIDS AND OVER-STIMULATION ON INSULIN SECRETION IN MAN

218. Arne Åsberg: EPIDEMIOLOGICAL STUDIES IN HEREDITARY HEMOCHROMATOSIS: PREVALENCE, MORBIDITY AND BENEFIT OF SCREENING.
219. Johan Fredrik Skomsvoll: REPRODUCTIVE OUTCOME IN WOMEN WITH RHEUMATIC DISEASE. A population registry based study of the effects of inflammatory rheumatic disease and connective tissue disease on reproductive outcome in Norwegian women in 1967-1995.
220. Siv Mørkved: URINARY INCONTINENCE DURING PREGNANCY AND AFTER DELIVERY: EFFECT OF PELVIC FLOOR MUSCLE TRAINING IN PREVENTION AND TREATMENT
221. Marit S. Jordhøy: THE IMPACT OF COMPREHENSIVE PALLIATIVE CARE
222. Tom Christian Martinsen: HYPERGASTRINEMIA AND HYPOACIDITY IN RODENTS – CAUSES AND CONSEQUENCES
223. Solveig Tingulstad: CENTRALIZATION OF PRIMARY SURGERY FOR OVARAIN CANCER. FEASIBILITY AND IMPACT ON SURVIVAL
224. Haytham Eloqayli: METABOLIC CHANGES IN THE BRAIN CAUSED BY EPILEPTIC SEIZURES
225. Torunn Bruland: STUDIES OF EARLY RETROVIRUS-HOST INTERACTIONS – VIRAL DETERMINANTS FOR PATHOGENESIS AND THE INFLUENCE OF SEX ON THE SUSCEPTIBILITY TO FRIEND MURINE LEUKAEMIA VIRUS INFECTION
226. Torstein Hole: DOPPLER ECHOCARDIOGRAPHIC EVALUATION OF LEFT VENTRICULAR FUNCTION IN PATIENTS WITH ACUTE MYOCARDIAL INFARCTION
227. Vibeke Nossum: THE EFFECT OF VASCULAR BUBBLES ON ENDOTHELIAL FUNCTION
228. Sigurd Fasting: ROUTINE BASED RECORDING OF ADVERSE EVENTS DURING ANAESTHESIA – APPLICATION IN QUALITY IMPROVEMENT AND SAFETY
229. Solfrid Romundstad: EPIDEMIOLOGICAL STUDIES OF MICROALBUMINURIA. THE NORD-TRØNDELAG HEALTH STUDY 1995-97 (HUNT 2)
230. Geir Torheim: PROCESSING OF DYNAMIC DATA SETS IN MAGNETIC RESONANCE IMAGING
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232. Arnulf Langhammer: RESPIRATORY SYMPTOMS, LUNG FUNCTION AND BONE MINERAL DENSITY IN A COMPREHENSIVE POPULATION SURVEY. THE NORD-TRØNDELAG HEALTH STUDY 1995-97. THE BRONCHIAL OBSTRUCTION IN NORD-TRØNDELAG STUDY
233. Einar Kjelsås: EATING DISORDERS AND PHYSICAL ACTIVITY IN NON-CLINICAL SAMPLES
234. Arne Wibe: RECTAL CANCER TREATMENT IN NORWAY – STANDARDISATION OF SURGERY AND QUALITY ASSURANCE

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235. Eivind Witsø: BONE GRAFT AS AN ANTIBIOTIC CARRIER
236. Anne Mari Sund: DEVELOPMENT OF DEPRESSIVE SYMPTOMS IN EARLY ADOLESCENCE
237. Hallvard Lærum: EVALUATION OF ELECTRONIC MEDICAL RECORDS – A CLINICAL TASK PERSPECTIVE
238. Gustav Mikkelsen: ACCESSIBILITY OF INFORMATION IN ELECTRONIC PATIENT RECORDS; AN EVALUATION OF THE ROLE OF DATA QUALITY
239. Steinar Krokstad: SOCIOECONOMIC INEQUALITIES IN HEALTH AND DISABILITY. SOCIAL EPIDEMIOLOGY IN THE NORD-TRØNDELAG HEALTH STUDY (HUNT), NORWAY
240. Arne Kristian Myhre: NORMAL VARIATION IN ANOGENITAL ANATOMY AND MICROBIOLOGY IN NON-ABUSED PRESCHOOL CHILDREN
241. Ingunn Dybedal: NEGATIVE REGULATORS OF HEMATOPOIETEC STEM AND PROGENITOR CELLS
242. Beate Sitter: TISSUE CHARACTERIZATION BY HIGH RESOLUTION MAGIC ANGLE SPINNING MR SPECTROSCOPY
243. Per Arne Aas: MACROMOLECULAR MAINTENANCE IN HUMAN CELLS – REPAIR OF URACIL IN DNA AND METHYLATIONS IN DNA AND RNA
244. Anna Bofin: FINE NEEDLE ASPIRATION CYTOLOGY IN THE PRIMARY INVESTIGATION OF BREAST TUMOURS AND IN THE DETERMINATION OF TREATMENT STRATEGIES

245. Jim Aage Nøttestad: DEINSTITUTIONALIZATION AND MENTAL HEALTH CHANGES AMONG PEOPLE WITH MENTAL RETARDATION
246. Reidar Fossmark: GASTRIC CANCER IN JAPANESE COTTON RATS
247. Wibeke Nordhøy: MANGANESE AND THE HEART, INTRACELLULAR MR RELAXATION AND WATER EXCHANGE ACROSS THE CARDIAC CELL MEMBRANE

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248. Sturla Molden: QUANTITATIVE ANALYSES OF SINGLE UNITS RECORDED FROM THE HIPPOCAMPUS AND ENTORHINAL CORTEX OF BEHAVING RATS
249. Wenche Brenne Drøyvold: EPIDEMIOLOGICAL STUDIES ON WEIGHT CHANGE AND HEALTH IN A LARGE POPULATION. THE NORD-TRØNDELAG HEALTH STUDY (HUNT)
250. Ragnhild Støen: ENDOTHELIUM-DEPENDENT VASODILATION IN THE FEMORAL ARTERY OF DEVELOPING PIGLETS
251. Aslak Steinsbekk: HOMEOPATHY IN THE PREVENTION OF UPPER RESPIRATORY TRACT INFECTIONS IN CHILDREN
252. Hill-Aina Steffenach: MEMORY IN HIPPOCAMPAL AND CORTICO-HIPPOCAMPAL CIRCUITS
253. Eystein Stordal: ASPECTS OF THE EPIDEMIOLOGY OF DEPRESSIONS BASED ON SELF-RATING IN A LARGE GENERAL HEALTH STUDY (THE HUNT-2 STUDY)
254. Viggo Pettersen: FROM MUSCLES TO SINGING: THE ACTIVITY OF ACCESSORY BREATHING MUSCLES AND THORAX MOVEMENT IN CLASSICAL SINGING
255. Marianne Fyhn: SPATIAL MAPS IN THE HIPPOCAMPUS AND ENTORHINAL CORTEX
256. Robert Valderhaug: OBSESSIVE-COMPULSIVE DISORDER AMONG CHILDREN AND ADOLESCENTS: CHARACTERISTICS AND PSYCHOLOGICAL MANAGEMENT OF PATIENTS IN OUTPATIENT PSYCHIATRIC CLINICS
257. Erik Skaaheim Haug: INFRARENAL ABDOMINAL AORTIC ANEURYSMS – COMORBIDITY AND RESULTS FOLLOWING OPEN SURGERY
258. Daniel Kondziella: GLIAL-NEURONAL INTERACTIONS IN EXPERIMENTAL BRAIN DISORDERS
259. Vegard Heimly Brun: ROUTES TO SPATIAL MEMORY IN HIPPOCAMPAL PLACE CELLS
260. Kenneth McMillan: PHYSIOLOGICAL ASSESSMENT AND TRAINING OF ENDURANCE AND STRENGTH IN PROFESSIONAL YOUTH SOCCER PLAYERS
261. Marit Sæbø Indredavik: MENTAL HEALTH AND CEREBRAL MAGNETIC RESONANCE IMAGING IN ADOLESCENTS WITH LOW BIRTH WEIGHT
262. Ole Johan Kemi: ON THE CELLULAR BASIS OF AEROBIC FITNESS, INTENSITY-DEPENDENCE AND TIME-COURSE OF CARDIOMYOCYTE AND ENDOTHELIAL ADAPTATIONS TO EXERCISE TRAINING
263. Eszter Vanky: POLYCYSTIC OVARY SYNDROME – METFORMIN TREATMENT IN PREGNANCY
264. Hild Fjærtoft: EXTENDED STROKE UNIT SERVICE AND EARLY SUPPORTED DISCHARGE. SHORT AND LONG-TERM EFFECTS
265. Grete Dyb: POSTTRAUMATIC STRESS REACTIONS IN CHILDREN AND ADOLESCENTS
266. Vidar Fykse: SOMATOSTATIN AND THE STOMACH
267. Kirsti Berg: OXIDATIVE STRESS AND THE ISCHEMIC HEART: A STUDY IN PATIENTS UNDERGOING CORONARY REVASCULARIZATION
268. Björn Inge Gustafsson: THE SEROTONIN PRODUCING ENTEROCHROMAFFIN CELL, AND EFFECTS OF HYPERSEROTONINEMIA ON HEART AND BONE

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269. Torstein Baade Rø: EFFECTS OF BONE MORPHOGENETIC PROTEINS, HEPATOCYTE GROWTH FACTOR AND INTERLEUKIN-21 IN MULTIPLE MYELOMA
270. May-Britt Tessem: METABOLIC EFFECTS OF ULTRAVIOLET RADIATION ON THE ANTERIOR PART OF THE EYE
271. Anne-Sofie Helvik: COPING AND EVERYDAY LIFE IN A POPULATION OF ADULTS WITH HEARING IMPAIRMENT
272. Therese Standal: MULTIPLE MYELOMA: THE INTERPLAY BETWEEN MALIGNANT PLASMA CELLS AND THE BONE MARROW MICROENVIRONMENT

273. Ingvild Saltvedt: TREATMENT OF ACUTELY SICK, FRAIL ELDERLY PATIENTS IN A GERIATRIC EVALUATION AND MANAGEMENT UNIT – RESULTS FROM A PROSPECTIVE RANDOMISED TRIAL
274. Birger Henning Endreseth: STRATEGIES IN RECTAL CANCER TREATMENT – FOCUS ON EARLY RECTAL CANCER AND THE INFLUENCE OF AGE ON PROGNOSIS
275. Anne Mari Aukan Rokstad: ALGINATE CAPSULES AS BIOREACTORS FOR CELL THERAPY
276. Mansour Akbari: HUMAN BASE EXCISION REPAIR FOR PRESERVATION OF GENOMIC STABILITY
277. Stein Sundstrøm: IMPROVING TREATMENT IN PATIENTS WITH LUNG CANCER – RESULTS FROM TWO MULITCENTRE RANDOMISED STUDIES
278. Hilde Pleym: BLEEDING AFTER CORONARY ARTERY BYPASS SURGERY - STUDIES ON HEMOSTATIC MECHANISMS, PROPHYLACTIC DRUG TREATMENT AND EFFECTS OF AUTOTRANSFUSION
279. Line Merethe Oldervoll: PHYSICAL ACTIVITY AND EXERCISE INTERVENTIONS IN CANCER PATIENTS
280. Boye Welde: THE SIGNIFICANCE OF ENDURANCE TRAINING, RESISTANCE TRAINING AND MOTIVATIONAL STYLES IN ATHLETIC PERFORMANCE AMONG ELITE JUNIOR CROSS-COUNTRY SKIERS
281. Per Olav Vandvik: IRRITABLE BOWEL SYNDROME IN NORWAY, STUDIES OF PREVALENCE, DIAGNOSIS AND CHARACTERISTICS IN GENERAL PRACTICE AND IN THE POPULATION
282. Idar Kirkeby-Garstad: CLINICAL PHYSIOLOGY OF EARLY MOBILIZATION AFTER CARDIAC SURGERY
283. Linn Getz: SUSTAINABLE AND RESPONSIBLE PREVENTIVE MEDICINE. CONCEPTUALISING ETHICAL DILEMMAS ARISING FROM CLINICAL IMPLEMENTATION OF ADVANCING MEDICAL TECHNOLOGY
284. Eva Tegnander: DETECTION OF CONGENITAL HEART DEFECTS IN A NON-SELECTED POPULATION OF 42,381 FETUSES
285. Kristin Gabestad Nørsett: GENE EXPRESSION STUDIES IN GASTROINTESTINAL PATHOPHYSIOLOGY AND NEOPLASIA
286. Per Magnus Haram: GENETIC VS. AQUIRED FITNESS: METABOLIC, VASCULAR AND CARDIOMYOCYTE ADAPTATIONS
287. Agneta Johansson: GENERAL RISK FACTORS FOR GAMBLING PROBLEMS AND THE PREVALENCE OF PATHOLOGICAL GAMBLING IN NORWAY
288. Svein Artur Jensen: THE PREVALENCE OF SYMPTOMATIC ARTERIAL DISEASE OF THE LOWER LIMB
289. Charlotte Björk Ingul: QUANITIFICATION OF REGIONAL MYOCARDIAL FUNCTION BY STRAIN RATE AND STRAIN FOR EVALUATION OF CORONARY ARTERY DISEASE. AUTOMATED VERSUS MANUAL ANALYSIS DURING ACUTE MYOCARDIAL INFARCTION AND DOBUTAMINE STRESS ECHOCARDIOGRAPHY
290. Jakob Nakling: RESULTS AND CONSEQUENCES OF ROUTINE ULTRASOUND SCREENING IN PREGNANCY – A GEOGRAPHIC BASED POPULATION STUDY
291. Anne Engum: DEPRESSION AND ANXIETY – THEIR RELATIONS TO THYROID DYSFUNCTION AND DIABETES IN A LARGE EPIDEMIOLOGICAL STUDY
292. Ottar Bjerkeset: ANXIETY AND DEPRESSION IN THE GENERAL POPULATION: RISK FACTORS, INTERVENTION AND OUTCOME – THE NORD-TRØNDELAG HEALTH STUDY (HUNT)
293. Jon Olav Drogset: RESULTS AFTER SURGICAL TREATMENT OF ANTERIOR CRUCIATE LIGAMENT INJURIES – A CLINICAL STUDY
294. Lars Fosse: MECHANICAL BEHAVIOUR OF COMPACTED MORSELLISED BONE – AN EXPERIMENTAL IN VITRO STUDY
295. Gunilla Klensmeden Fosse: MENTAL HEALTH OF PSYCHIATRIC OUTPATIENTS BULLIED IN CHILDHOOD
296. Paul Jarle Mork: MUSCLE ACTIVITY IN WORK AND LEISURE AND ITS ASSOCIATION TO MUSCULOSKELETAL PAIN
297. Björn Stenström: LESSONS FROM RODENTS: I: MECHANISMS OF OBESITY SURGERY – ROLE OF STOMACH. II: CARCINOGENIC EFFECTS OF *HELICOBACTER PYLORI* AND SNUS IN THE STOMACH

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298. Haakon R. Skogseth: INVASIVE PROPERTIES OF CANCER – A TREATMENT TARGET ? IN VITRO STUDIES IN HUMAN PROSTATE CANCER CELL LINES
299. Janniche Hammer: GLUTAMATE METABOLISM AND CYCLING IN MESIAL TEMPORAL LOBE EPILEPSY
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