CENTRE FOR
FERTILITY AND HEALTH

ANNUAL REPORT 2020

NIPH
Norwegian Institute of Public Health

Norwegian
Centre of
Excellence
The Research Council of Norway

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INTRODUCTION FROM THE CENTRE DIRECTORS

PER MAGNUS
CENTRE DIRECTOR

SIRI E. HÅBERG
CENTRE DEPUTY DIRECTOR

2020 has shown us how fast the world can change. Yet, despite unforeseen challenges, CEFH has continued to grow with new team members and research projects. The ongoing pandemic has also provided new research opportunities for our centre.

A year of pandemic

Covid-19 has impacted the lives of us all, including members of the Centre for Fertility and Health. Most centre employees have been working from home for the major part of 2020. This is challenging for a research environment which thrives on lively informal discussions. Nevertheless, we have made great advances in our research projects, welcomed new team members, and arranged several digital seminars to foster scientific exchange.

New research initiatives have been initiated in response to the pandemic. We are for example providing new and essential information on COVID-19-related risks to pregnant women and their newborns, and investigating potential demographic, disease- and pregnancy-related risk factors for Covid-19.

Continued growth

In 2020, we welcomed several new team members and recruited new team members who will start in 2021. We welcomed guest researchers for prolonged stays and hired researchers in part-time positions.

By the end of 2020, 22 women and 31 men were formally associated with CEFH. Our staff includes full-time and part-time researchers, international researchers with whom we have established collaboration agreements, and administrative personnel. In addition, the CEFH team collaborates closely with researchers in Norway and abroad at acclaimed research institutions.

In 2020, we invited all researchers with permanent positions in the Centre to be part of our extended leader group and to take a more active role in the strategic development of the Centre.

A network for PhD candidates at the

Norwegian Institute of Public Health is led from the Centre and includes almost 40 PhD students from many parts of the institute working on a range of research topics.

To strengthen our applications for funding we have built a support system for writing grant applications, giving administrative support and facilitating involvement in the writing processes by all members of the CeFH team. In 2020, we obtained funding for seven new large research projects: an ERC Starting Grant awarded to Maria Magnus, three research projects from the Research Council of Norway, two projects from NordForsk and a project from the U.S. National Institutes of Health. In addition, we have included our new team member Jacqueline Cohen's research project in our project portfolio.

Scientific output

Researchers at the centre have published 240 papers since the Centre was established in 2017, of which 96 were published in 2020. The publications reflect our multidisciplinary approach with publications in demography, genetics, statistical methods, psychology and epidemiology. Many publications are the result of long-lasting collaborations with other research institutions around the world. In this annual report we showcase some examples of our scientific output.

Collaborations and networks

As an interdisciplinary centre, it is especially important to facilitate an open and friendly atmosphere to foster informal discussions between researchers from different disciplines. We have created open weekly seminars, an invested in available workspaces for guest researchers and in attracting long-term international visitors. 2020 was a challenging year for all this. Nevertheless, we have organized over 40 weekly seminars, a digital centre symposium and workshop with international attendance as well as informal digital centre lunches to keep in touch as a team. We strongly believe that these efforts help building resilience and prepare us for the advent of face-to-face meetings on a daily basis.

We feel privileged and honoured to lead the CeFH team, an outstanding group of people. We are confident that our joint efforts will help us to make exciting discoveries and are looking forward to the years to come.

Per Magnus
Centre Director

Siri E. Håberg
Centre Deputy Director

HIGHLIGHTS 2020

Selected publications

Bratsberg B, Røgeberg O, & **Skirbekk V**. (2020). Fathers of children conceived using ART have higher cognitive ability scores than fathers of naturally conceived children. *Human Reproduction*, 35(6), 1461-1468.

Carlsen EØ, **Magnus MC**, Omsland TK, **Magnus PM**, **Håberg SE**, & **Wilcox AJ**. (2020). Stumped by the Hump: The Curious Rise and Fall of Norwegian Birthweights, 1991–2007. *Epidemiology*, 31(4).

Gjerdevik M, **Gjessing HK**, **Romanowska J**, Haaland ØA, **Jugessur A**, Czajkowski NO, & **Lie RT**. (2020). Design efficiency in genetic association studies. *Statistics in Medicine*, 39(9), 1292-1310.

Hart RK, & **Kravdal Ø**. (2020). Fallende fruktbarhet i Norge [Fertility decline in Norway]. Rapport 2020. Oslo: Folkehelseinstituttet, 2020.

Kravdal Ø, **Magnus P**, Moum B, & Høivik ML. (2020). Association of Childbearing With a Short-Term Reduced Risk of Crohn Disease in Mothers. *American Journal of Epidemiology*, 189(4), 294-304.

Kvalvik LG, **Wilcox AJ**, **Skjærven R**, Østbye T, & Harmon QE. (2020). Term complications and subsequent risk of preterm birth: registry based study. *BMJ*, 369, m1007.

Lee Y, **Haftorn KL**, **Denault WRP**, **Nustad HE**, **Page CM**, **Lyle R**, Lee-Ødegård S, Moen GH, Prasad RB, Groop LC, Sletner L, Sommer C, **Magnus MC**, **Gjessing HK**, **Harris JR**, **Magnus P**, **Håberg SE**, **Jugessur A**, & **Bohlin J**. (2020). Blood-based epigenetic estimators of chronological age in human adults using DNA methylation data from the Illumina MethylationEPIC array. *BMC Genomics*, 21(1), 747.

Magnus MC, Guyatt AL, Lawn RB, Wyss AB, Trajanoska K, Küpers LK, Rivadeneira F, Tobin MD, London SJ, Lawlor DA, Millard LAC, & Fraser A. (2020). Identifying potential causal effects of age at menarche: a Mendelian randomization phenome-wide association study. *BMC medicine*, 18(1), 71-71.

Torvik FA, **Eilertsen EM**, McAdams TA, Gustavson K, Zachrisson HD, Brandlistuen R, Gjerde LC, Havdahl A, Stoltenberg C, Ask H, & Ystrom E. (2020). Mechanisms linking parental educational attainment with child ADHD, depression, and academic problems: a study of extended families in The Norwegian Mother, Father and Child Cohort Study. *Journal of Child Psychology and Psychiatry*, 61: 1009-1018.

Litteraturhuset February 2020: Launcing our report on declining fertility in Norway togheter with collaborators from Statistics Norway, the Institute for Social Research and the University of Oslo.

Happy participants at our gathering in Son in February 2020, shortly before lockdown. *Photo: Robert Lyle*.

Major events

- February 10-11, 2020: CeFH seminar on research communication, Son
- February 24, 2020: Launch of fertility report, Litteraturhuset
- September 21, 2020: Digital workshop with participants from three large cohort studies: The Avon Longitudinal Study of Parents and Children (ALSPAC), The Trøndelag Health Study (HUNT) and the Norwegian Mother, Father and Child Cohort Study (MoBa).
- September 24, 2020: 3rd Annual CEFH Symposium, this year as a digital event.
- December 1, 2020: Digital Centre seminar
- Over 40 seminars

PhD defenses

Miriam Gjerdevik defended her thesis for the PhD degree at the University of Bergen on June 15, 2020. She was also awarded, together with **Rolv Terje Lie** and Øystein Haaland, a tuition award for developing a new teaching program in statistics at the University of Bergen.

Three PhD candidates, **Christina Hansen Edwards**, **Yunsung Lee** and **William Denault** submitted their PhD thesis.

New funding

We obtained funding for eight new large research projects. The new projects are:

European Research Council

- INFERTILITY: Understanding the causal nature of the relationship between infertility and cardiovascular disease, led by **Maria C. Magnus**

Research Council of Norway

- Women's fertility – an essential component of health and well-being, led by **Siri E. Håberg**
- Sickness in the Family: A Register Study on the Short- and Long-Term Effects of Severe Sickness on Family Members, led by **Øystein Kravdal** together with **Jonathan Wörn** and **Bjørn-Atle Reme**
- Lost in transition? Uncovering social and health consequences of sub-optimal transitions in the education system, led by **Martin Flatø**
- ADHD medication in pregnancy: understanding the population and outcomes related to treatment use and discontinuation, led by **Jacqueline Cohen**

U.S. National Institutes of Health

- Changing lives, changing brains: How modern family and work life influences ADRD risks, led by Bjørn Heine Strand and **Vegard Skirbekk**

NordForsk

- SCOPE - Scandinavian studies of COvid-19 in PrEgnancy, led by **Siri E. Håberg**
- Addressing the smoking paradox in the etiology of COVID-19 through population-based studies, our work package led by **Per Magnus**

Recruitment

We recruited one researcher, two postdocs, one PhD candidate and one Medical Research student – **Ida H. Caspersen, Thomas Kleppestø, Miriam Gjerdevik, Hans Fredrik Sunde and Lise Andrea Arge.**

OUR RESEARCH

The scientific goal of the Centre is to greatly advance the understanding of how changes in patterns of fertility and family structure influence child and adult health through social and biological pathways. To reach this goal, the Centre has put together an international team including epidemiologists, geneticists, demographers, statisticians, and economists.

In this annual report, we describe our research in five integrated themes of research. We also present our key research projects. Most of our research projects and activities cut across several research themes.

Theme 1: Maternal and paternal age.
We investigate the impact of advanced maternal and paternal age at childbirth on the risk of disease in the offspring.

Theme 2: Fertility problems.
We investigate the health consequences of subfertility and assisted reproductive technologies in parents and children.

Theme 3: Fertility and family structure.
We investigate the health consequences of many components of reproductive history, such as the number of children/siblings, childlessness, the age at first birth, the interval between births, and family instability.

Theme 4: Statistical methods.
We develop advanced statistical methods that help address research questions in the Centre.

Theme 5: Intergenerational transmission of health.
We investigate how health and disease are transmitted between generations through biological and social pathways.

THEME 1

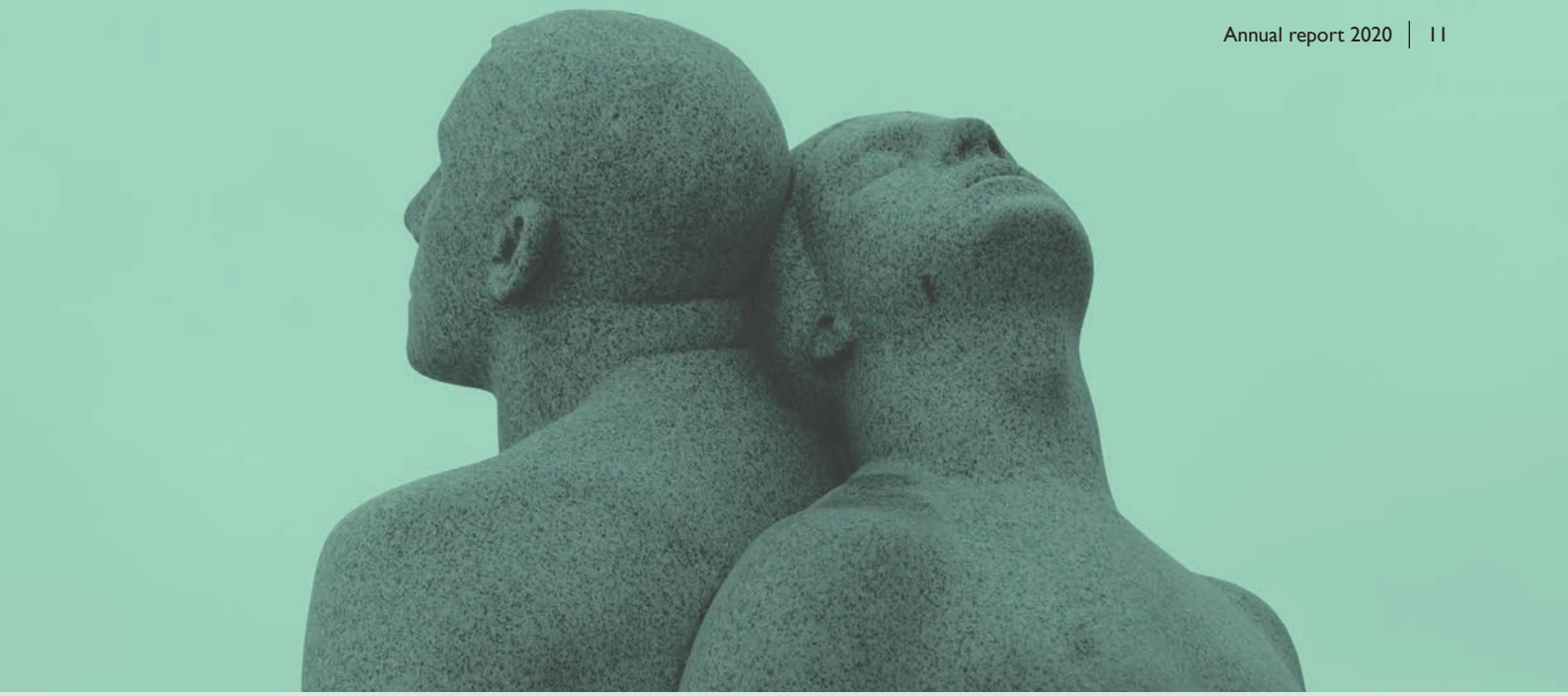
MATERNAL AND PATERNAL AGE

Parental age at first birth is increasing in most countries. In Theme 1, we investigate the impact of advanced maternal and paternal age at childbirth on diseases in offspring. We study how biological age is associated with fecundity and disease development.

Parental age at first birth is rising in most countries. For example, in Norway, the mean age of mothers at first birth increased from 23.3 years in 1970 to 29.0 years in 2016. The mean age of men at first birth has also increased. At the same time, the total number of children born to each woman has declined across the world, and this is not only because of the later entry into motherhood. One of the Centre's goals is to add to the knowledge about how a higher maternal and paternal age affect pregnancy outcomes and children's health, through social and biological mechanisms.

Norway is an excellent venue to study this because trends are similar to those observed elsewhere in affluent countries. Additionally, unique data collected in Norway enable detailed long-term prospective studies.

One of several possible biological mechanisms that are studied in the Centre involves telomere biology. The social pathways are also diverse. For example, one reason why parental age may affect child health is that older parents are more likely to have higher economic resources to spend on their children. They may also have accumulated more knowledge and may be more mature. On the other hand, they are less likely to survive until the child reaches adulthood. Another issue, addressed under theme 3, is that the age when a person becomes a parent (for the first time) has implications for his or her health, through both biological and social pathways.



THEME 2

The use of assisted reproduction technologies is increasing. In Theme 2, we investigate the health consequences of subfertility and assisted reproductive technologies in parents and children. To this end, we employ advanced (epi)genetic analysis and statistical models.

FERTILITY PROBLEMS

As mothers' and fathers' age at first birth have increased, we have also witnessed increased fecundity problems in the population. There has been a steady increase in the use of assisted reproductive technology (ART) since its introduction in Norway in 1984. Because the total number of births per woman has also decreased, the proportion of children conceived in this way has increased. Today, around 2500 children are born in Norway each year through ART, which is about 4% of all births, and around 7 million children have been born through ART worldwide. Moreover, as in other countries, there has been an increase in childlessness in Norway, from 10% in 1985 to 13% in 2015 for women and much more pronounced in men, from 14% 1985 to 23% in 2015.

Whilst most mothers treated with ART and children born through ART are healthy, there is some evidence pointing to adverse effects. ART has been associated with adverse pregnancy outcomes and increased risk of congenital malformations, infant morbidity and mortality. ART is also associated with several childhood diseases as well as cardiovascular diseases and cancer in mothers. One proposed mechanism for the detrimental effects of ART procedures is epigenetic modifications of the DNA during gametogenesis, fertilisation, and early embryonic development. However, it is not clear whether the observed adverse effects of ART are caused by the procedure itself or if it is caused by the underlying subfertility or higher age of the mother.

We will estimate short and long-term health consequences of ART for women and offspring using a combination of data from registers, cohorts and biological samples. In particular, we are interested in health consequences of subfertility in women and men, and will examine epigenetic changes induced by ART, and determine their possible roles in diseases.

THEME 3

FERTILITY AND FAMILY STRUCTURE

Our goal is to contribute to a better understanding of how the number of children, age at first birth, length of birth intervals, and partnership disruptions affect the health of parents, and how the number of siblings, birth interval lengths and parental disruption affect offspring health.

The demographic setting

As age at first birth has increased and the number of children born to each woman has decreased over the past decades, more people are ending up childless. Additionally, there have been marked changes in marriage, divorce and cohabitation patterns over the last half century: The age at marriage and the proportion of people who never marry have increased, while divorce rates have escalated. Couples living together in consensual unions have largely compensated for this shift away from marriage, but these unions are much more unstable. In combination with an increase in the proportion of children born outside of marriage, and most commonly to cohabiting parents, these patterns and trends in partnership instability have led to a sharp rise in the proportion of children who experience parental disruption. For example, 39% of 17-year old children in 2015 did not live with both their parents. Because many parents form new partnerships after disruption, and often have children in these partnerships, families are becoming more and more complex. The changes in marriage, divorce, cohabitation and family structure have been influenced by (and contributed to) the fertility changes, and the two sets of changes have also been driven by many of the same forces. Because of this close relationship between fertility and family behaviour, it is reasonable to take both into account in studies of health implications.

Goals

Our goal is to contribute to a better understanding of how the number of children, age at first birth, length of birth intervals, and partnership disruptions affect the health of parents, and how the number of siblings, birth interval lengths and parental disruption affect offspring health. The reproductive factors may affect the parents' health through both biological mechanisms (linked to physiological processes during pregnancy or lactation) and social pathways. As examples of social pathways, the number of children likely affects a person's lifestyle and may be important for access to support in old age, whereas early entry into parenthood may disrupt education or work careers, with later implications for health. Comparisons between fertility-health associations among women and men shed light on the relative importance of biological and social mechanisms.

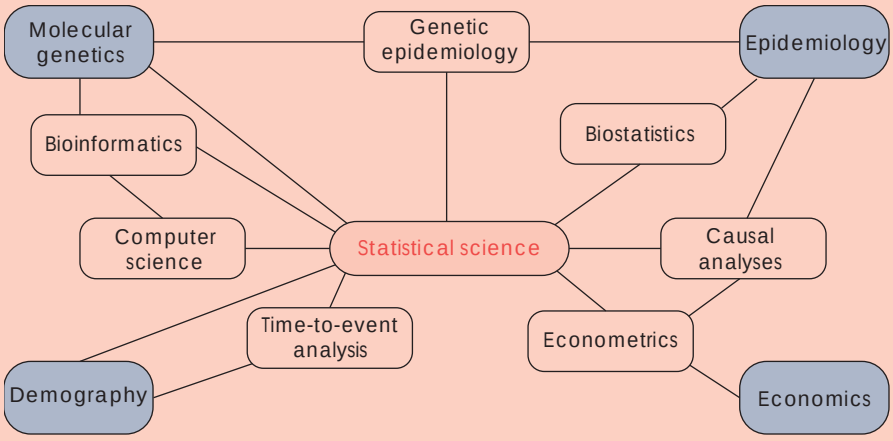
THEME 4

We develop advanced statistical methods that help address research questions in the Centre.

STATISTICAL METHODS

The Centre's interdisciplinary approach to understand health implications of the recent changes in fertility patterns and family structure requires close collaborations between different disciplines, as well as coordination and development of research methodology. While the different disciplines at the Centre have different traditions, different terminology and different approaches to research methodology, statistical modeling is a unifying theme across all disciplines. We have therefore added statistical methodology as a new, central theme to the original four themes of focus. The figure below illustrates some of the many interdisciplinary links in the use of statistical analyses.

Our research projects employ numerous statistical analysis strategies where we contribute actively to the methods development.



Statistical methodology at the Centre.

THEME 5

We investigate how health and disease are transmitted between generations through biological and social pathways.

INTER-GENERATIONAL TRANSMISSION OF HEALTH

Health factors can be transmitted to subsequent generations in several ways. First, certain characteristics of the parents that are important for their own health, such as their socioeconomic resources, lifestyles and attitudes may be passed on to their children through various types of "social transmission". Second, a trait from the parents can be inherited through genes. Third, the parents' health may affect the daily life in the home, their ability to care for the children, and the children's education and income, all of which in turn may be important for the children's health.

Relative importance of genes and environmental factors

We will estimate the relative importance of genes and environmental factors in transmission of certain diseases and indicators of wellbeing. We will use GWAS data from the Norwegian Mother, Father and Child Cohort Study to calculate genetic risk scores for both adults and offspring. Thus, we can examine the interaction between genetic and social factors with respect to the risk of specific diseases.

Transmissions of disease and risk factors

Using data from two large cohort studies, Cohort of Norway (CONOR) and the Norwegian Mother, Father and Child Cohort Study, we will analyse transmissions of disease and risk factors (such as smoking, high caloric intake diets, and low levels of physical activity) across three generations, from grandparents via parents to children. Detailed questionnaire data, physiological measures and physical tests will allow us to consider a broad range of biological and socio-economic factors that can be involved.

Analyses across multiple generations

We further plan to extend perspectives on intergenerational transmission of health to more than three generations by using historic demographic data that include seven to nine generations. We will assess whether the health of children today is related to the health of their ancestors. We will take into account the longevity of past generations, and also explore influences via family size and structures, socioeconomic resources and environmental contexts. For these studies, we will make use of the National Historical Population Register. The National Historical Population Register is a project to register and link information from various sources, and thus construct a register of the whole Norwegian population since 1801.

KEY PROJECTS

PROJECTS WITH EXTERNAL FUNDING AND KEY PROJECTS

Reproduction, partner disruption and health

The main aim of the project is to understand the health consequences of changes in fertility patterns and partner disruption. The health consequences are studied at the population level, with special focus on mortality and morbidity from cancer, cardiovascular diseases and mental disorders.

The data collected for this project constitutes the basis for many of our coming research papers. Our research questions are divided in four sub-projects:

- How do maternal/paternal age at birth, number of siblings, and age interval between siblings affect children's health?
- How do the number of children (including childlessness), age at first birth, and interval between births affect adult health?
- How does disruption of parental relationships, and possible parental re-partnering, affect children's health?
- How does disruption of relationships, and possible re-partnering, affect the health of the involved adults?

In the sub-projects, we will study various outcomes, including children's health, adult's health and risk factors for disease and health problems.

In 2020, we got access to data from Statistics Norway, the Cancer Registry of Norway, Control and Payment of Health Refunds (KUHR) and the Norwegian Twin Registry. We have also applied for data from several other registers, but these are not yet in place. We have started to do the first analysis on the dataset.

Project manager: Per Magnus and Øystein Kravdal

START - Study of assisted reproductive technology - epigenetic mechanisms

The main aim of the project is to understand health consequences of subfertility in women and men, and to examine how genetic influences and epigenetic differences are associated with subfertility and the use of assisted reproductive technologies (ART). Both genetic and epigenetic mechanisms play a role in health outcomes after the use of ART.

The epigenetic differences in children born with the use of ART compared to naturally conceived children has been investigated during 2020 and is now in its final phase. We are also looking into the mediating effect of DNA methylation on birth outcomes and further expanding analyses of smoking on DNA methylation in children and parents. There is an extensive international interest in the data and results.

The project is funded by the Research Council of Norway through the Centre of Excellence grant.

Project manager: Siri E. Håberg

ART - Assisted Conceptions - Pregnancy and childhood outcomes

In this project we combine Norwegian registry data and questionnaire data from the MoBa cohort study to investigate causes and consequences of subfertility and assisted conceptions. The project was initiated in 2014 and has been updated with new datasets in 2018. Main outcomes include fetal growth, gestational length, fetal loss, vanishing twins, and health in children and parents with subfertility and use of ART.

In 2020 our Brundtland visiting scholar, Gizachew Tessema, came to visit us and work in this project. We are moving forward with analyses regarding the importance of inter-pregnancy inter-

vals on pregnancy outcomes. We also finalized the work on growth in children born after ART with follow up in MoBa and in registries until 17 years of age.

The project is funded by the Research Council of Norway through the Centre of Excellence grant.

Project manager: Siri E. Håberg

Metabolic profile and IVF, pregnancy, perinatal and longer-term outcomes

We will combine metabolic profiles, genome-wide genotypic data, and clinical factors to understand causal mechanisms for, and accurately predict, adverse pregnancy, perinatal and postnatal outcomes in in vitro fertilisation (IVF) and spontaneously conceived pregnancies. Differences in pregnancy metabolic profiles are likely to be important, but it is only recently that studies of pregnant women have detailed measurements of metabolic profiles assessed during pregnancy.

We plan to add metabolomic profiles to pregnancy samples on a subgroup of 16 000 women and 5000 of their male partners in MoBa who have genome-wide genotypic data on trios. These data will contribute to evidence that will enhance our understanding of the role of pregnancy metabolism on pregnancy and perinatal outcomes. We will use machine learning methods to develop prediction algorithms for each adverse outcome, and also for 'healthy' pregnancy, and test the discrimination and calibration of these, as well as compare them to similar metrics for prediction using established risk factors collected at the first antenatal clinic.

In 2020, the biobank has started pulling the 16000 parental plasma samples that will be analyzed for metabolic compounds. Despite some Covid19-related delays, shipping of the first batch of samples were done. We look forward to finalizing sample pull and start analyses in 2021.

The project is funded by grants to Professor Deborah A Lawlor (ERC Advanced Grant and UK National Institute of Health Research Senior Investigator award).

Key personnel at the Centre: Siri Eldevik Håberg, Per Magnus, Maria C. Magnus

InPreSS - International Pregnancy Drug Safety Studies. Short and long-term safety of drug use in pregnancy

InPreSS is an international collaboration to study the safety of drug use in pregnancy. The overarching objective is to better understand the consequences of in-utero drug exposure on fetal development, birth defects and longer-term outcomes (neurodevelopment outcomes and academic performance) in the child, comparative drug safety, as well as maternal social and health consequences of discontinued drug treatment.

In 2020, we prepared the Nordic register data according to our Common Data Model. Analyses focusing on risks of major congenital malformations (antipsychotics, antiepileptics, antidiabetics), neurodevelopmental disorders (antipsychotics, antiepileptics), and adverse maternal outcomes (antidepressant discontinuation) were carried out. Manuscripts for these aims are in progress. We had a seminar with the Norwegian Medicines Agency on November 16th to share the results of our published and ongoing studies in on use and safety of antidiabetics, antiepileptics, and modafinil in pregnancy. We published 4 papers, presented at 2 conferences (EASD, ICPE), and submitted one paper for publication.

The project is funded by the Research Council of Norway through the BEDREHELSE program.

Project manager: Kari Furu

Dimjob - Social, demographic and health dimensions of technology-induced job loss

The project will study Norwegian population registries and surveys on occupation and firm data, education, cognitive test performance, personality, coping, health, intergenerational data, social isolation, physiological and mental health trajectories. We will study how these factors relate to how individuals respond in terms of demographic, social and health outcomes, including quality of life, re-employment, disease incidence, training and demographic outcomes (e.g., partnership stability, childbearing, internal migration).

Two postdocs, Jonathan Wörn and Bjørn-Atle Reme started late 2019. They have both focused on analyzing data in 2020.

The projects is funded by the Research Council of Norway's VAM program.

Project manager: Vegard Skirbekk

Snapshot from our 3rd Annual CeFH Symposium. A familiar view for many in 2020.

National Historical Population Register for Norway (HPR) 1800-2024

The main aim of the project is to build a longitudinal population register including all persons who lived in Norway in the period 1800-1964, and which will be integrated with the National Population Register. This register will be very valuable in studies of the population over the life course, and for the research in the Centre. The Historical Population Register is constructed from linking data from censuses, church books and other primary sources.

A new application for funding to continue and extend the present project was submitted to the Research Council of Norway in November 2020. However, even without current funding, work to complete the construction of HPR has continued, partly funded by the Norwegian Institute of Public Health. Progress on digitalization and linkage of sources from 1900-1960 has progressed particularly well, and we expect major deliverables in 2021 and 2022. We are still committed to facilitate full linkage of the historical registers and datasets with existing modern microdata

The project is funded by the Research Council of Norway's FORINFRA program since 2013.

Key personnel at the Centre: Kåre Bævre and Per Magnus

HEALTH-GAP. Health, maturity, and the gender gap in education

The primary objectives of the project are to understand the health consequences of gender differences in educational attainment and school performance and to examine whether the difference in timing of physical maturity between girls and boys is a major explanation for the observed gender gaps in education. Educational attainment is likely to affect fertility and health in several ways. Firstly, more educated men and women have increased their fertility compared with their less educated peers. Secondly, combining health risks of low educational attainment with little social support in terms of family network may be particularly damaging for health, and perhaps especially for men's health. Thirdly, an assortative mating among people with low education may further exacerbate individual health risks in this group.

Members of the project continued to be present in the public debate in 2020. Several scientific papers addressing the key issues were submitted for publication and will be published in 2021. We have also hired Thomas Kleppestø as a postdoc in the project.

The project is funded by the Research Council of Norway's BEDREHELSE program.

Project manager: Fartein Ask Torvik

REMENTA - Reproduction of socioeconomic differences and mental health across generations

The aim of this project is to understand the role of mental health in the reproduction of socioeconomic differences. Children of parents with low socioeconomic status do less well in school and are at risk of drop-out, low education, unemployment, and social exclusion. It is not adequately understood why social differences reproduce. There is a close relationship between socioeconomic status and mental health that signals that mental health could be a key to understand reproduction of social differences and mobility.

The project will utilize survey and genetic data from The Norwegian Mother, Father and Child Cohort Study and register data on health, demography and school performance. We will use administrative register data from the entire population of Norway.

In 2020 we have hired Hans Fredrik Sunde as a PhD candidate and Magnus Nordmo as a postdoc in the project. The first paper in the project was published in 2020 in JCPP, the highest ranking journal in developmental psychology.

Project manager: Fartein Ask Torvik

The Burden of Obesity in Norway

The main aim of the project is to study the impact of obesity on morbidity, mortality, health service use and social insurance benefits in Norway. The project aims to gain a deeper understanding of the total burden of obesity in Norway by estimating individual trajectories and cost of illness by different demographic and social characteristics. Secondly, we aim to elucidate the causal impact of obesity on health and health service use by the use of genetic markers as natural experiments.

In 2020 we have written two articles that are for peer-review. The PhD candidate in the project, Christina Hansen Edwards, submitted her thesis for evaluation and will defend for the degree of PhD in 2021.

The project is funded by the Research Council of Norway's FRIMEDBIO program (Young Research Talents).

Project manager: Jonas Minet Kinge

Evaluation of free school fruit on childhood growth and obesity: a natural experiment

The primary objective of the project is to estimate the effect of the free school fruit program on childhood growth and obesity.

In the period 2007 to 2014, pupils in junior high-schools and combined primary and junior high-schools were given a free fruit/vegetable each day, while pupils in primary schools were not. We have measured height and weight among 13-year olds in more than 150 schools to evaluate the effects of this natural experiment. The data are currently being analysed.

The project is funded by the Research Council of Norway's BEDREHELSE program.

Project manager: Per Magnus

Telomere length, epigenetic age and T cells in women who give birth at an older age

This project aims to investigate female fecundity in the context of three major indices of biological age: telomere length, epigenetic age, and immune status. The hypothesis is that women with a longer telomere length, younger epigenetic age and healthier immune status than their peers have an increased ability to give birth to their first child at an older age.

DNA samples of 2000 trios (mother, father and newborn) from the Norwegian Mother and Child Cohort Study (MoBa) were selected for this project. Rutgers University (USA) will measure leukocyte telomere length in these 2000 trios, whereas UCLA, United States will measure DNA methylation in 1000 of the mothers aged 32 years and above.

In 2020, two batches of telomere length data were transferred from Rutger University (New Jersey, USA). Preliminary analyses were carried out to replicate known characteristics of telomere length. A PhD candidate in this project, Yunsung Lee, published a paper on epigenetic clocks using the MoBa-START data and submitted his PhD thesis to the University of Oslo.

The project is funded by the Research

Council of Norway's FRIPRO program.

Project manager: Astanand Jugessur

Telomeres and female fecundity

The background of the project is the observation that women with delayed menopause and those who give birth to children later in life show less cardiovascular disease and live longer than other women. Women with constitutively long telomere length have delayed menopause, show less cardiovascular disease and also live longer than other women.

The central hypothesis of this project is that women who bear children later in life without the use of ART might have a constitutively long telomere length. The aims of the study are: 1) to measure telomere length in 1700 mothers who gave birth at ages 18 years or older, including 1000 mothers who gave birth at the age 35 years and older; 2) measure telomere length in 300 mothers who gave birth at the age of 35 years and older with the aid of in-vitro fertilization; 3) measure telomere length in the 2000 fathers (the sexual partners) of the mothers in aims 1 and 2); and 4) to measure telomere length in newborns of these parents.

In 2020, the PhD candidate in the project, Kristine Løkås Haftorn, submitted the first paper and presented her work at two PhD conferences.

The project is funded by the US National Institutes of Health (NIH) and by the Research Council of Norway through the Centre of Excellence grant.

Key personnel at the Centre: Astanand Jugessur, Per Magnus, Håkon Gjessing.

The intrauterine redox state and telomere length in the newborn

The aim of the project is to examine (1) the association between newborn's leukocyte telomere length and mitochondrial genotypes, and (2) associations between newborn's leukocyte telomere length and maternal smoking during pregnancy.

In 2020, the COVID-19 pandemic has had major consequences on acquiring the mtDNA sequence data central to the original project. Not only has COVID-19 impeded progress in securing the necessary paperwork for the material transfer agreement between our collaborator, UPENN and the NIPH, but since August 2020, a recent verdict from the EU Court of justice on the Schrems II case (C-311/18) has invalidated a previous EU-US agreement that allowed the transfer of sensitive personal information from Europe to third-party countries such as the US. We are currently working on solving these issues.

The project is funded by the Research Council of Norway's FRIMEDBIO program.

Project manager: Håkon Gjessing, Astanand Jugessur

We are celebrating new projects and life in general at our centre director's traditionnal summer garden party in June. *Photos: Christian Page*.

NEW PROJECTS IN 2020

Maternal Effects on Asthma - Revisiting and dissecting the maternal effect on childhood asthma

It is well established that childhood asthma is more common when the mother has asthma than when the father has it. Although this has been reproduced by many researchers, none of them have come up with a good explanation for the effect. At present there is no efficient primary prevention of childhood asthma, due to lack of etiological insight. We aim to discover the biology behind the maternal effect using data from a large pregnancy cohort, the Norwegian Mother, Father, and Child Cohort Study (MoBa), and from nationwide registries.

The project is funded by the Research Council of Norway's FRIMEDBIO program.

Project manager: Per Magnus

Women's fertility – an essential component of health and well-being

More women than before seek treatment for infertility. Infertility, and more generally childlessness, is associated with increased risk of early death and chronic disease. The mechanisms behind these associations are poorly understood. Both social and biological pathways are suggested. Underlying causes of subfertility may contribute to later disease risk. Not having been pregnant, breastfeeding or having children may directly affect the physiology, but also the lifestyle and social support of women, and thereby increase the risk of adverse health. Understanding the causes and consequences of infertility is important for understanding women's health and well-being.

The project is funded by the Research Council of Norway's KVINNEHELSE funding scheme.

Project manager: Siri E. Håberg

Sickness in the Family: A Register Study on the Short- and Long-Term Effects of Severe Sickness on Family Members

Even with a well-developed welfare scheme like in Norway, severe sickness can have significant negative effects on the life trajectory of both the patient and their close family members. We investigate the effects of severe sickness on family members' labor market participation, educational achievements and health, both in the short and long term. Our focus will be on young families, where the offspring are particularly dependent on the parents.

The project is funded by the Research Council of Norway's VAM programme.

Project manager: Øystein Kravdal, together with Bjørn-Atle Reme and Jonathan Wörn

Lost in transition? Uncovering social and health consequences of sub-optimal transitions in the education system

The overarching aim of this project is to understand the effects of transitions in the education system on later labour market participation, family formation, and health. The project will consider how starting school at a suitable age, attending an upper secondary school of choice, and managing to complete upper secondary education affect later social participation and health.

The project is funded by the Research Council of Norway's FRIHUMSAM programme.

Project manager: Martin Flatø

ADHD medication in pregnancy: understanding the population and outcomes related to treatment use and discontinuation

This project sets out to understand risks associated with use or discontinuation of drug treatment for ADHD during pregnancy. The project will use valuable existing data sources including population-based national health registries from Norway and Sweden and the Norwegian Mother, Father and Child Cohort Study (MoBa). We will be collaborating with researchers in Canada and Sweden for high quality studies that aim to generate new knowledge that will empower women with ADHD to make informed treatment choices and advance research on the safe use of medicines during pregnancy.

The project is funded by the Research Council of Norway's FRIPRO - Young Research Talents programme.

Project manager: Jacqueline Cohen

INFERTILITY: Understanding the causal nature of the relationship between infertility and cardiovascular disease

The INFERTILITY project aims at filling several existing knowledge gaps to understand the nature of the relationship between infertility and cardiovascular disease. The working hypothesis is that both infertile men and women have an increased risk of cardiovascular disease, and that this might at least partly reflect a greater burden of cardiovascular disease risk factors.

The project is funded by the European Research Council's Starting Grant funding scheme.

Project manager: Maria Magnus

Changing lives, changing brains: How modern family and work life influences ADRD risks

The prevalence of Alzheimer's disease and related dementias (ADRD) is projected to triple by 2050. Currently, there is no known effective medical treatment for ADRD. Prevention through behavioral changes affecting ADRD risk is therefore of utmost importance. Rapid changes that characterize modern family life and work are two critical domains that likely impact ADRD risk. A shift to "modern" family structures and work tasks have occurred relatively early in Norway, and unique data availability allows these changes to be studied prospectively to predict coming changes in ADRD in the US and other countries.

The project is funded by the U.S. National Institutes of Health Research Project Grant Program (R01)

Project manager: Bjørn Heine Strand, together with Vegard Skirbekk

Schooling in children with ADHD

Children with ADHD perform on average poorer in school than other children. It is still unclear how big this disadvantage is, and which subjects these children struggle with the most. It is also unclear to what extent different prevalence of ADHD between boys and girls contributes to boys' poorer performance in school. We investigate these questions by using unique register data for the entire Norwegian population, which includes diagnoses, results from national tests and grades in upper secondary school.

The project is funded by the Oslo University Hospital's NevSom funding.

Project manager: Fartein Torvik

SCOPE- Scandinavian studies of COvid-19 in PrEgnancy

It is not known if pregnant women are especially susceptible to COVID-19, or if they are at higher risk of developing severe symptoms and complications. Many countries have included pregnant women in the group of particularly susceptible individuals, out of a precautionary principle. The limited evidence available today, do suggest that pregnant women with COVID-19 and their newborns are at increased risk of adverse outcomes, and vertical transmission (from mother to foetus) cannot be ruled out and may affect foetuses in yet unrecognized ways. Combining results from the three Scandinavian countries will strengthen our ability to study severe COVID-19 illness, susceptible subgroups and non-frequent outcomes. The Scandinavian countries have had different course of the pandemic, and this enables us to compare results from different contexts with similar data resources.

The project is funded by NordForsk's Nordic Health Data Research Projects on Covid-19 programme

Project manager: Siri E. Håberg

Addressing the smoking paradox in the etiology of COVID-19 through population-based studies

The role of tobacco use in the incidence and in the prognosis of COVID-19 has raised much international interest, due to contrasting findings reported so far in the scientific literature. Given the public health importance of tobacco use as risk factor for morbidity and mortality it is urgent to provide both the scientific and the broad lay community with sound information from large population studies. We will analyse the potentially causal association of tobacco use (smoking and snus) with incidence and prognosis of Covid-19 using existing longitudinal population studies in Finland, Norway and Sweden.

The project is funded by NordForsk's Nordic Health Data Research Projects on Covid-19 programme

Project manager: Maria Rosaria Galanti (Karolinska Institutet) and Per Magnus

PHD PROJECTS IN 2020

Miriam Gjerdevik
"Family-based genetic association models"
Miriam defended her thesis on June 15 2020 at the University of Bergen

Christina Hansen Edwards
"Economic Consequences of Elevated BMI in Norway"
Christina submitted her thesis in 2020

William Denault
"Wavelet-based methods in genetic epidemiology"
William submitted his thesis in 2020

Yunsung Lee
«Human aging, DNA methylation, and telomere length: Investigating indices of biological aging"
Yunsung submitted his thesis in 2020

Ellen Øen Carlsen
"Parental age and subfertility as risk factors for adverse pregnancy outcome"

Kristine Løkås Haftorn
"Using DNA methylation for estimation of gestational age, and its application to ART-pregnancies"

Dana Kristjansson
"Mitochondrial DNA and Norwegians"

Hans Fredrik Sunde
"Mental health and intergenerational transmission of social differences"

Lise Andrea Arge
"Miscarriage history and subsequent fecundability: Results from the Norwegian Mother, Father and Child Cohort Study"
Medical Student Research Program at the University of Oslo

POSTDOC PROJECTS IN 2020

Thomas Kleppestø
"Health Gap: Health, maturity, and gender gap in education"

Vera Mitter
"Risk of infections and chronic immune-mediated diseases among children conceived by assisted reproductive technologies"

Bjørn-Atle Reme
"The DIMJOB project: Impact of technological progress on the labor market"

Jonathan Wörn
"The DIMJOB project: Consequences of unemployment for families and children"

NEW TEAM MEMBERS 2020

SEVEN RESEARCHERS STARTED IN 2020

Lise Andrea Arge

Lise became a member of the Centre team in August 2020. She is a student at the Medical Student Research Program at the University of Oslo (Forskerlinjen) and is currently working on a project exploring the relationship between previous miscarriages and subsequent fecundability, using data form the Norwegian Mother, Father and Child Cohort Study.

Ida Henriette Caspersen

Ida started at the Centre in September 2020. She holds a master's degree in cellular and molecular biology from NTNU and a PhD in environmental epidemiology from the University of Oslo where she investigated early life exposure to environmental toxicants and associations with child neurodevelopment. Before joining the Centre, she was a postdoc at the Norwegian Institute of Public Health. She works on various projects related to Covid-19.

Jacqueline Cohen

Jacqueline joined the Centre in November 2020. She obtained her PhD at McGill University in 2015 and has been a postdoc in epidemiology at Harvard T.H. Chan School of Public Health before coming to the Norwegian Institute of Public Health in 2018. At the Centre, she is the principal investigator of the project ADHD medication in pregnancy: understanding the population and outcomes related to treatment use and discontinuation.

Miriam Gjerdevik

Miriam started in a postdoc position at the Centre in August 2020. She is a biostatistician with a master's degree in mathematical statistics from the University of Bergen where she also obtained her PhD on family-based genetic association models in 2020. She has been affiliated with the Centre during her PhD. In her postdoc she aims to develop new methodology in family-based biobank data.

Thomas Kleppestø

Thomas started at the Centre in November 2020. He holds a PhD in Psychology from the University of Oslo where he studied the roles of genetics, environments, evolution and personality in the formation of political attitudes. As a postdoc in the Health Gap project at the Centre, he will investigate the causes of sex differences in educational achievement, and the consequences this might have for mental health.

Andreas Nydal

Andreas joined the Centre in November 2020 with the aim of developing a PhD project. He is a trained medical doctor from the University of Oslo, and has specialized in psychiatry. Andreas has a broad interest in fertility and epidemiology, in particular related to male infertility and gender dysphoria.

Hans Fredrik Sunde

Hans Fredrik joined the Centre in August 2020. He holds a master's degree in psychology from the Norwegian University of Science and Technology, where he specialized on the subject learning; brain, behavior and environment. Hans Fredrik will investigate the close link between mental health and social differences, which could be a key for understanding how social differences are transmitted through generations.

NEW PART-TIME POSITIONS IN 2020

Espen Moen Eilertsen

Espen holds a PhD on genetic and environmental etiology of childhood ADHD from the Department of Psychology at the University of Oslo, where he is currently employed as a postdoc. At the Centre, Espen is involved in the Rementa-project working with on family-based intergenerational analysis of register data.

Robert Lyle

Robert holds a BSc in Genetics and a PhD in Human Genetics and is Core Facility Leader and Senior Scientist at the Norwegian Sequencing Centre at the University of Oslo. At the Centre, Robert is involved in the START project working on genetic and epigenetic analysis of offspring born after assisted reproductive technologies and their parents.

GUEST RESEARCHERS IN 2020

Ian Colman

Ian is Professor at the School of Epidemiology & Public Health at the University of Ottawa, Canada. He visited the Centre from August, 2019, to June, 2020, and worked with the MoBa study to investigate how stressors early in life influence Norwegian mothers' mental health, their relationship with their partner, and the mental health of their offspring. He also worked with the Studentenes Helse- og Trivselsundersøkelse (SHoT study) to investigate how social media and substance use are associated with suicidality in Norwegian university students. Ian is still an affiliate at the Centre after moving back to Canada.

Vera Mitter

Vera is a graduated Pharmacist and holds a MSc in Demography and Health from the London School of Hygiene and Tropical Medicine, UK. In June 2020, she finished her PhD in epidemiology on obstetric and perinatal outcomes of assisted reproductive technologies (ART) at the University of Bern, Switzerland. Vera obtained a mobility grant from the Swiss National Science Foundation (SNF) to conduct a Postdoc at the Center for Fertility and Health at FHI. Since September 2020 she works with Maria Magnus and Siri Håberg on the long term health of children after ART, using MoBa and Norwegian Registry data.

Gavin Pereira

Gavin is a perinatal epidemiologist, environmental health researcher and biostatistician in the discipline of Epidemiology and Biostatistics at the School of Public Health, Curtin University. He is a visiting professor at the Centre for Fertility and Health in 2020-2021 working on several project and research topics such as algorithms for predicting stillbirth and perinatal morbidity, maternal and environmental exposures, effects of interpregnancy intervals. He is also developing a prepregnancy cohort in Western Australia.

THE GRO HARLEM BRUNDTLAND VISITING SCHOLARSHIP

The Centre is strongly committed to the education and engagement of young researchers and has established the Gro Harlem Brundtland Visiting Scholarship. This visiting scholar program hosts young researchers from Norway and abroad to engage in collaborative research and to participate in and enrich the research community at the Centre and at the Norwegian Institute of Public Health. The scholarship was announced for the first time in May 2018, and we plan to open for new applications on a yearly basis.

Gizachew Tessema

Gizachew Tessema was awarded the Gro Harlem Brundtland Visiting Scholarship in 2019, and stayed at the Centre from Jan-Mar 2020.

Gizachew completed his PhD in Public Health in 2018 from the University of Adelaide, Australia. Prior to that, he graduated his MPH and bachelor's degrees in Ethiopia. His main research focus includes, but not limited to, perinatal epidemiology, family planning and contraception and global health. In 2020, he has been awarded the Australian National Health and Medical Research Council Emerging Leaders Fellowship (2021-2025) to develop risk stratification model to prevent avoidable perinatal morbidity and mortality in Australia. He is currently basing at Curtin University, Western Australia.

During his stay at the Centre, Gizachew investigated the role of interpregnancy interval misclassification bias on the risk of adverse pregnancy outcomes. He also studied the association between interpregnancy interval and adverse pregnancy outcomes among pregnancies following miscarriages. For both studies, Gizachew accessed data linkage that combined the Medical Birth Registry, Patient Registry, and the general practitioner database.

Gizachew's stay at the Centre was also supported by the Charter Hall Collaboration Award he received from the Raine Medical Foundation at the University of Western Australia.

PEOPLE

Leader Group

Per Magnus
Centre Director

Siri E. Håberg
Deputy Centre Director

Håkon K. Gjessing
Principal Investigator

Øystein Kravdal
Principal Investigator

Vegard F. Skirbekk
Principal Investigator

Fredrik Swift
Head of Administration

Researchers

Lise Andrea Arge
Medical Research Student

Jon Bohlin
Researcher

Bernt Bratsberg
Researcher

Kåre Bævre
Researcher

Ellen Øen Carlsen
PhD candidate

Ida Caspersen
Researcher

Jacqueline Cohen
Researcher

Ian Colman
Visiting Professor

William Denault
PhD candidate

Christina H. Edwards
PhD candidate

Espen Moen Eilertsen
Researcher

Martin Flatø
Researcher

Kari Furu
Researcher

Miriam Gjerdevik
Postdoc

Kristine Løkås Haftorn
PhD candidate

Hans Ivar Hanevik
Researcher

Jennifer R. Harris
Researcher

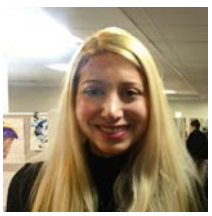
Rannveig Kaldager Hart
Researcher

Álvaro Hernaéz
Postdoc

Astanand Jugessur
Researcher

Jonas Minet Kinge
Researcher

Thomas Kleppestø
Postdoc



Dana Kristjansson
PhD candidate

Yunsung Lee
PhD candidate

** list updated March 2021*

Rolv Terje Lie
Researcher

Robert Lyle
Researcher

Maria C. Magnus
Researcher

Vera Mitter
Postdoc

Magnus Nordmo
Postdoc

Andreas Nydal
Researcher

Christian Page
Researcher

Gavin Pereira
Visiting Professor

Espen Beer Prydz
PhD candidate

Bjørn-Atle Reme
Postdoc

Liv Bente Romundstad
Researcher

Rolv Skjærven
Researcher

Siri Skodvin
PhD candidate

Anders Skrondal
Researcher

Karoline Hansen Skåra
PhD candidate

Hans Fredrik Sunde
PhD candidate

Fartein Ask Torvik
Researcher

Aage Tverdal
Researcher

Jonathan Wörn
Postdoc

Administrative staff

Katrine Kranstad
Project Coordinator

Randi Sekkeseter
Project Coordinator

Linda Selje Sunde
Project Coordinator

Beate Østengen
Project Coordinator

Affiliated researchers

These scholars supported our application for the status of Centre of Excellence or have a formalised role as affiliated researchers.

Abraham Aviv, *Rutgers, The State University of New Jersey, USA*
Eric Bonsang, *Université de Paris Dauphine, France*
Alice Goisis, *University College London, UK*
Emily Grundy, *University of Essex, UK*
Hans-Peter Kohler, *University of Pennsylvania, USA*
Mikko Myrskylä, *Max Planck Institute for Demographic Research, Germany*
Haakon Nustad, *DeepInsight*
Laura Oakley, *London School of Hygiene and Tropical Medicine, UK*
Julia Romanowska, *University of Bergen*
Wendy Sigle, *London School of Economics and Political Science, UK*
George Davey Smith, *University of Bristol, UK*
Ezra S. Susser, *Columbia University Mailman School of Public Health*
Allen J. Wilcox, *National Institute of Environmental Health Sciences, USA*

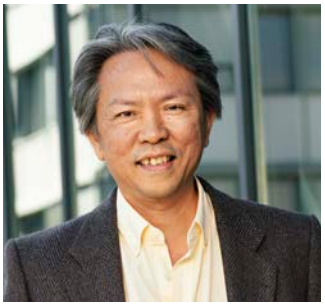
SCIENTIFIC ADVISORY COMMITTEE

David Leon
Professor of epidemiology
Faculty of Epidemiology and Population Health
London School of Hygiene & Tropical Medicine, London, UK.

Roberta B. Ness
Rockwell professor of public health
University of Texas, Houston, USA.

Torkild Hovde Lyngstad
Professor of sociology
Department of Sociology and Human Geography
University of Oslo, Norway.

Susan Sawyer
Professor of adolescent health
The University of Melbourne
and
Director of the RCH Centre for Adolescent Health, Australia.



Yudi Pawitan
Professor of biostatistics
Department of Medical Epidemiology and Biostatistics
Karolinska Institutet, Sweden.

Dag Erik Undlien
Professor of medical genetics
Department of Genetics
Oslo University Hospital
University of Oslo, Norway.

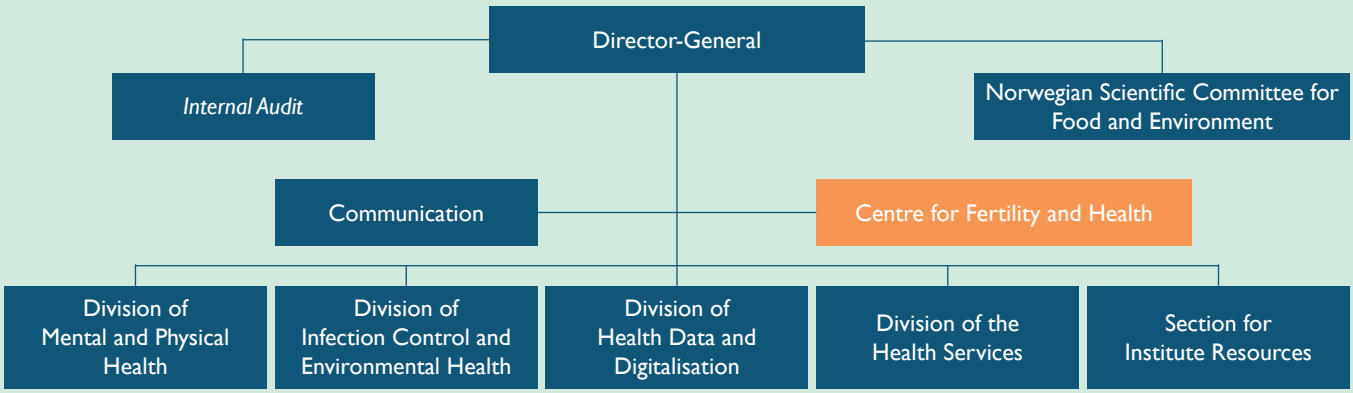
Matthijs Kalmijn
Professor of sociology and demography
University of Amsterdam, Netherlands
and
Senior Researcher at Netherlands Interdisciplinary Demographic Institute.

The mandate of the Scientific Advisory Committees is to:

- Take part in discussions of the Centre's research strategy and scientific challenges throughout the entire project period. The committee may also provide advice on other types of issues.
- Provide strategic advice to the Centre, based on international trends and scientific development within the field of fertility and health. As far as possible, the SAC should also be able to provide advice that is directly relevant to Norwegian needs and strategies.
- Assume an active role in monitoring the performance and scientific excellence of the Centre.
- Provide annually a short status report on the development of the Centre, drawing on annual reports and other material made available by the Centre.

ORGANISATION

ORGANISATION CHART FOR THE NORWEGIAN INSTITUTE OF PUBLIC HEALTH



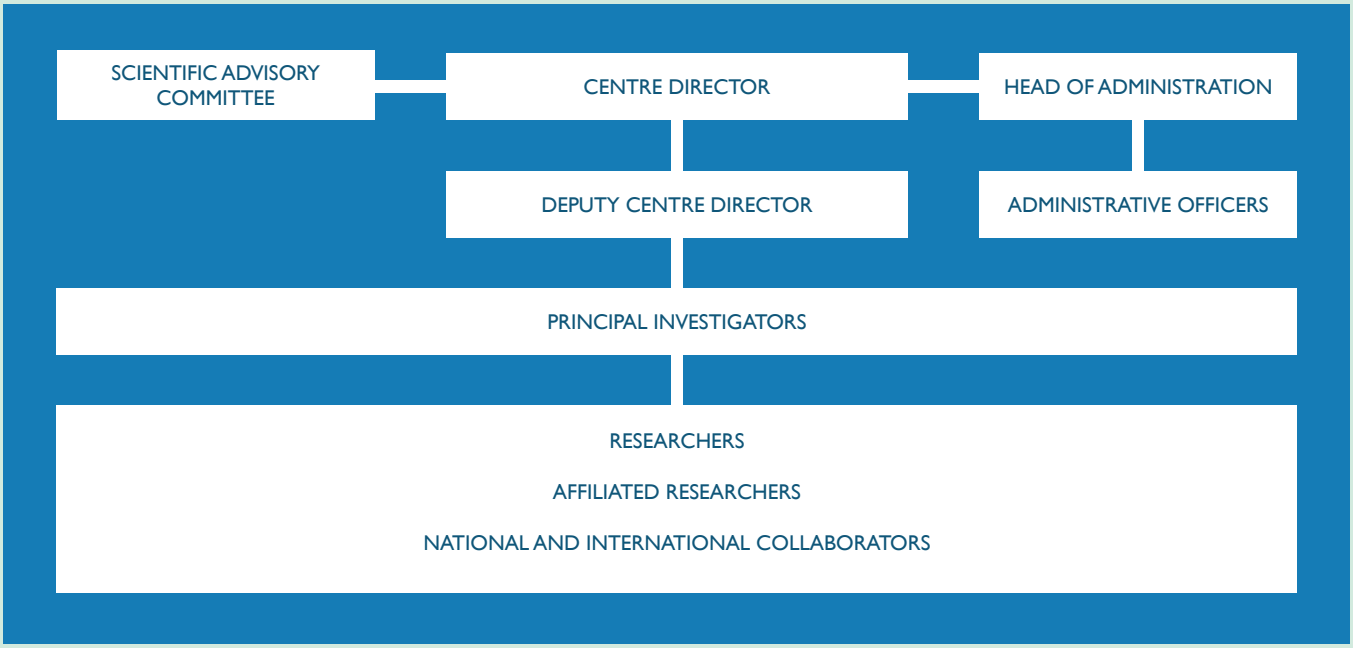
ORGANISATION OF THE CENTRE

CENTRE BOARD
Top Management Group at the Norwegian Institute of Public Health

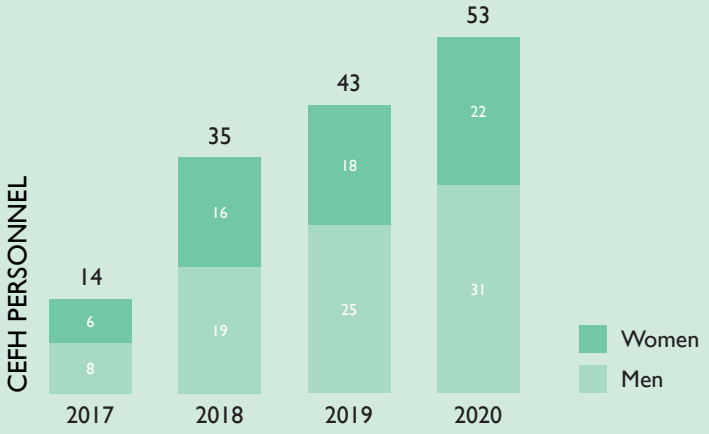
LEADER GROUP
Centre Director
Deputy Centre Director
Principal Investigators
Head of Administration

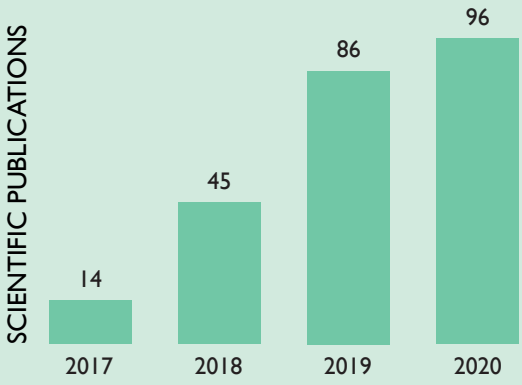
CENTRE TEAM
Leader Group
Researchers and Staff
Affiliated Researchers

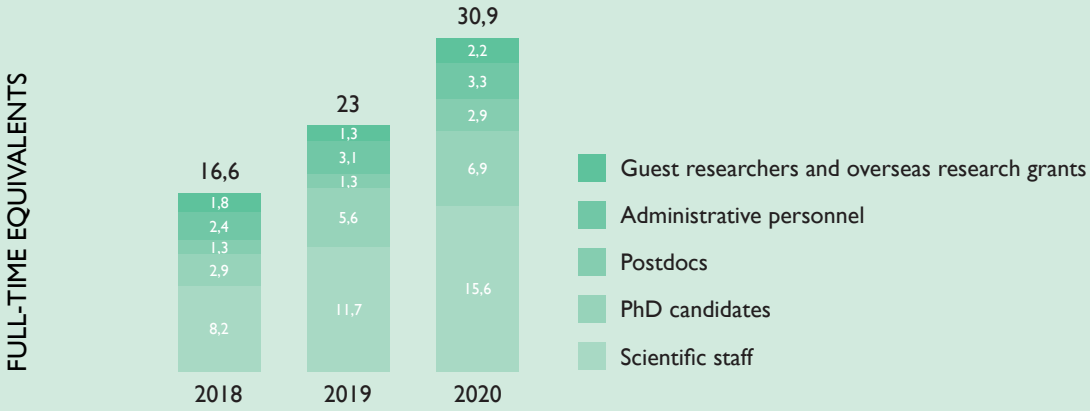
EXTENDED LEADER GROUP
Centre Director
Deputy Centre Director
Principal Investigators
Head of Administration
Researchers with permanent positions

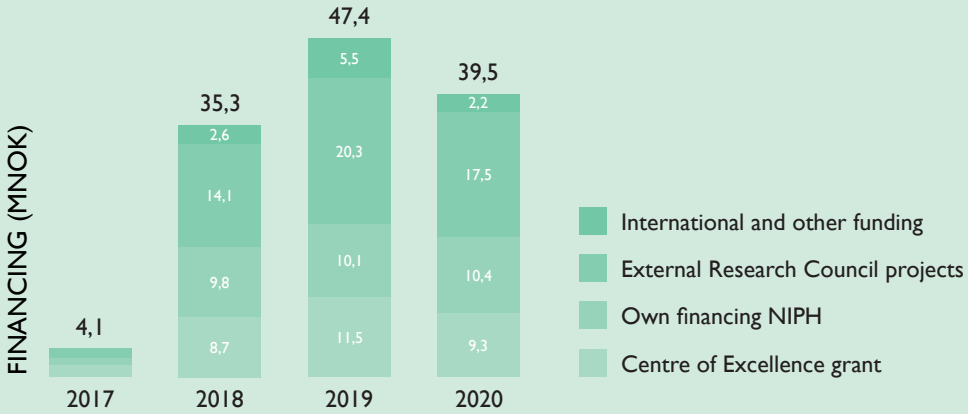


INDICATORS 2017-2020









PUBLICATIONS 2020

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BOOKS, DISCUSSION PAPERS & REPORTS

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LETTERS & CORRESPONDENCE

Fretheim A, **Flatø M**, Steens A, Flottorp SA, Rose CJ, Telle KE, **Kinge JM**, & Schwarze PE. (2020). COVID-19: we need randomised trials of school closures. J E*pidemiol Community Health*.

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SEMINARS 2020

THE CENTRE HAS INITIATED SEVERAL SERIES OF SEMINARS TO FOSTER SCIENTIFIC EXCHANGE.

CeFH Lunch Seminars

Our lunch seminars are informal research seminars that are normally held every Friday. Both researchers at the Centre and researchers from other parts of the world present interesting topics in fertility and health. The presentations include new research ideas, projects, results and methods as well as possible collaborative projects. Although primarily aimed at researchers at the Centre, the seminars are also open to other researchers.

CeFH Genetic Fridays

Genetics Fridays are held every Friday. This is an informal venue for all employees at the Norwegian Institute of Public Health and collaborators who work in genetics, plan to implement genetics in their work, or merely have an interest in genetics. There is room for presentations and/or discussions, where participants can share their knowledge and experience, come up with ideas, and discuss projects and methods.

CeFH Biostatistical Seminars

The biostatistical seminars have a focus on methods and their mathematical backgrounds. Grant applications may also be presented. We invite a broad range of researchers from Norway and abroad to discuss various topics such as causal inference, Bayesian methods, variable selection, and more. Statisticians and data analysts from the Norwegian Institute of Public Health are invited to join these meetings, as well as people from outside the institute.

<u>Lunch seminars, Genetic Fridays and Biostatistical seminars</u>

Torkild Hovde Lyngstad. OPENFLUX - Societal op enness, normative flux and the social modification of heritability. *January 10.*

Christine Sommer. Genetics and epigenetics in the STORK study. January 10. Iñaki Permanyer. The subnational human and gender development indices. *January 15.*

Dan Belsky. Polygenic Score Analysis of Human Development. *January 16.*

Dana Kristjansson. Mitochondrial genomics. *January 17.*

Ian Colman. Suicide and suicide contagion: is prevention possible? *January 24.*

Espen Moen Eilertsen. Two studies of direct and indirect genetic effects in MoBa. *January 24.*

Jonas Kinge. Childhood mental disorders and parental income. *January 31.*

Tobias Uller. Evolutionary perspectives on the developmental origins of health and disease. *February 7.*

Vegard Skirbekk. What is interdisciplinarity in research on fertility and health? *February 14.*

Fartein Torvik. Reproduction of socioeconomic differences and mental health across generations (REMENTA). *March 6.*

Simon Rayner. Data and information flow in the COVID-19 outbreak. March 20. Dana Kristjansson. Norwegian timeline and historical events relevant for mtDNA phylogeny. *June 5.*

Bushra Ishaq. Social determinants of health, birth rate and induced abortions

among Muslims in Norway. *June 12.*

Ellen Øen Carlsen. HbA1c in early second trimester and perinatal outcomes. June 19.

Hans Ivar Hanevik. The recent abrupt modernization of biotech-legislation in Norway. *August 28.*

Rolv Terje Lie. Familial Recurrence Risks and Genetic Contributions. August 28. Marianna Cortese. Term birth weight and neurodevelopmental disabilities. *September 4.*

Kristine L. Haftorn. Journal club - Single cell chromatin modification profiling reveals increased epigentic variations with aging. *September 4.*

Julia Romanowska. Gene-methylation interactions: Discovering region-wise DNA methylation levels that modify SNP-associated disease risk. *September 11.*

Vegard Skirbekk and **Hans Peter Kohler.** Interdisciplinary study on biological and social determinants of reproductive decisions and outcomes. *September 11.*

Jonathan Wörn. Work and Relationship Satisfaction in Times of the COVID-19 Pandemic - Evidence from Germany. *September 18.*

Miriam Gjerdevik. Meta-analysis of genetic association studies; opportunities and challenges. *September 18.*

Kari Furu. Trends and prevalence of gestational diabetes in Norway 2013 -2018. *September 25.*

Manuela Zucknick. Structured penalized regression for drug sensitivity prediction. *September 29.*

Per Magnus. Research on covid-19 - what is going on and what role for the Centre for Fertility and Health? *October 9.*

Christian M. Page. Journal club: Nature as a trialist? Deconstructing the analogy between Mendelian Randomization and randomized trials. *October 9.*

Lise Andrea Arge. Relationship between number of previous miscarriages and time-to-pregnancy in subsequent pregnancies in the Norwegian Mother, Father and Child Cohort Study. *October 16.*

Bjørn Olav Åsvold. An introduction to Mendelian randomization. *October 16.*

Ellen Øen Carlsen. Assessing work conditions for PhD students at the Norwegian Institute of Public Health during the Covid-19 pandemic. *October 23.*

Rosa Cheesman. Genetic nurture effects on mental health and education. *October 23.*

Tormod Rogne. The obesity paradox - Among patients with infectious diseases, is obesity really protective? *October 30.*

Håkon Gjessing. Heritability curves; a local measure of heritability. *October 30.*

Valeria Vitelli. Bayesian rank-based models for genomic data integration: some recent advances. *November 5.*

Gavin Pereira. Interpregnancy interval and autism spectrum disorder. *November 6*

Jonathan Wörn, **Bjørn-Atle Reme** and **Vegard Skirbekk**. Depressive symptoms following job loss and layoff during the COVID-pandemic. *November 13.*

Ole Bernt Lenning. A possible covariation between COVID19 lethality and Y Chromosome R1b in perspective of the epidemiological situation. *November 13.*

Øyvind Helgeland. MoBa genetics update. *November 20.*

Per Magnus, **Ida Caspersen**, **Lill Trogstad** and **Siri Mjaaland**. Results and plans for COVID-related research in cohorts. *November 27.*

Rolv Skjærven. HealthierWomen - an ERC Advanced Grant project affiliated with the Centre for Fertility and Health. *December 4.*

Christine Sommer and **Sindre Lee-Ødegård**. Introduction to EPIPREG and potential collaboration between MoBa and EPIPREG. *December 4.*

Siri Håberg and **Robert Lyle**. Altered epigenome in newborns conceived by assisted reproductive technologies. *December 18.*

Other CeFH events

CeFH seminar on research communication, Son. February 10-11.

Launch of fertility report, Litteraturhuset. February 24.

Digital workshop with participants from three large cohort studies: ALSPAC, HUNT, MoBa. September 21.

3rd Annual CEFH Symposium. September 24.

- **Ole Røgeberg**, the Frisch Center: Causal inference using observational data
- **Jo Thori Lind**, Department of Economics at the University of Oslo: The inequality of equal mating
- **Miriam Evensen**, the Norwegian Institute of Public Health: Mental health problems in adolescence, first births and union formation
- **Matthijs Kalmijn**, Netherland's Interdisciplinary Demographic Institute, member of the CeFH advisory board: The intergenerational transmission of health behaviors: Comparing stepparents and biological parents
- **Jordana Bell**, King's College London: Epigenetics, fertility, and health: Insights from twin studies
- **Fartein Ask Torvik** , CeFH: Educational burden of disease
- **Maria Christine Magnus**, CeFH: Understanding the causal nature of the relationship between infertility and cardiovascular disease (Presentation of a new research project)
- **Yunsung Lee**, CeFH: Epigenetic clock and pregnancy
- **Dana Kristjansson**, CeFH: Mitochondrial DNA and Norwegians

Seminar for PhD students at NIPH. October 21.

Digital Centre seminar on interdisciplinar research. December 1.

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CENTRE FOR
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