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Dietary assessment in adolescents

Report from a Nordic workshop December 2014

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Content

Preface	3
Introduction	4
Presentations and discussion	5
Themes of the workshop.....	5
Thursday December 4 th 2014.....	5
First theme: Recruitment of adolescents.....	5
Second theme: Dietary methods tailored to adolescents	10
Friday December 5 th 2015.....	17
Conclusion and perspectives	23
Appendix 1. Program	25

Preface

A Nordic workshop has been carried out with the aim of discussing the challenges of conducting dietary surveys among adolescents. Dietary surveys are an important tool in public health and nutrition education and in risk assessment of food habits. However, it can be both difficult to enroll adolescents in dietary surveys as well as to obtain valid information about dietary intake. On a workshop at Department of Food, Nutrition and Sport Science, Göteborg University December 4-5th 2014 researchers from Norway, Finland, Sweden, Iceland and Denmark discussed how to recruit adolescents to dietary surveys. It was also discussed how to reduce the burden of participation by tailoring the dietary method to the needs of adolescents, e.g. by using relevant technology such as smartphones.

Introduction

Researchers at the National Food Institute at the Technical University of Denmark have in cooperation with researchers from University of Oslo, Norway and University of Gothenburg, Sweden arranged a Nordic workshop with the aim of discussing difficulties of recruiting adolescents in dietary studies and how to ensure valid answers from participants. The workshop was funded by Nordic Council of Ministers.

The workshop took place the 4th to 5th of December 2014 at University of Gothenburg at the Department of Food, Nutrition and Sport Science and was organized by a Nordic group represented by:

- Sisse Fagt, senior advisor, Technical University of Denmark
- Ellen Trolle, senior researcher, Technical University of Denmark
- Christel Larsson, professor, University of Gothenburg
- Christina Berg, associate professor, University of Gothenburg
- Lene Frost Andersen, professor, University of Oslo

The workshop included 15 speakers from all five Nordic countries and in total 46 researchers participated in the workshop, 27 from Sweden, 7 from Norway, 1 from Iceland, 2 from Finland and 9 from Denmark.

Presentations and discussion

Themes of the workshop

The workshop addressed the following themes:

- Recruitment of adolescents for dietary surveys and studies
- Dietary methods tailored to adolescents
- Issues that make it difficult to capture adolescent's dietary intake e.g. irregularity of meals and meals not eaten at home

The program included 4-6 short presentations within each theme which was concluded with discussion in pairs or groups and in plenary. The program is shown in appendix 1.

Each speaker delivered an abstract of their presentation. In this report the themes are described by the abstracts of the presentations and a summary of the discussions.

Thursday December 4th 2014

Christel Larsson initiated the workshop by welcoming to University of Gothenburg on behalf of organizers and gave a short overview of the workshop program.

First theme: Recruitment of adolescents

The four speakers of the first theme gave insight into experience with challenges and initiatives to improve recruitment of participants for dietary surveys and studies. Abstracts of their presentations are reported in the following paragraphs.

Participation rate among children and adolescents in Norwegian dietary assessment studies – our experiences. Abstract by Anine Medin, University of Oslo

Recruiting participants to dietary surveys is increasingly challenging. From 1993-2000 the participation rate in national dietary surveys in Norway dropped from over 90% to 80%. In 2013 participation rates varied between 14%-65% in three smaller evaluation- and pilot-studies.

We have experienced that among 9-13 year olds recruiting through schools is the best arena. It is important to meet potential participants

face-to-face. Teachers and school staff are important resources, and may increase the participation rate significantly. Children need reminders and second chances to participate, this is especially important among the older age groups (13 year olds).

Peer pressure is also important among the 13 year olds. Giving participants a gift card also seems to motivate children and increase the participation rate further. In future studies we suggest to use substantial resources on a smaller number of invited children, to increase the participation rate, to get a more representative selection and thus a higher external validity in our studies.

How adolescents in low socioeconomic status areas perceive recruitment to dietary Survey, results from a qualitative study?

Abstract by Maria Magnusson, University of Gothenburg

Broad interventions aimed at improving health often increase health gaps between different socioeconomic groups. One reason for this is selection bias due to low participation from “hard to reach” groups. To explore reasons behind decisions to participate or abstain from participation, five focus groups interviews were conducted with young people in areas where many had low income, low education, were unemployed and/or born outside Europe. Importance of meaningfulness emerged as a strong theme, in parallel with disappointment about not being listened to. Questions about body weight were considered uncomfortable and potentially painful. Including respondent’s perspective, when constructing questionnaires, would decrease risk of maleficence and may increase participation rates. Failing to provide participants with feedback induces risk to decrease participation in future studies.

Recruitment of Finnish 9-11 y olds to health surveys - experience from studies conducted at Folkhälsan Research Center in Finland, Abstract by Eva Roos, Folkhälsan Research Center

Most Finnish children and adolescents are recruited to health surveys through schools. Most municipalities give permission to conduct studies in schools. Schools in years 2005-2010 have mainly allowed research projects in school settings but this has changed the last years, with fewer headmasters of schools allowing research during school time. When comparing different ways of recruiting 9-11 y olds in school settings, highest response rate (RR) (up to 95%) was reached if a negative consent (consent is given only if the parent do not want the child to participate in the study) was collected. If only questionnaire data with informed signed consent was collected, the RR was also quite high (up to 85%). When other measurements were included such as body measurements or saliva tests for genetic testing, the response rate was markedly lower (RRs 40-64%). In studies with follow up design the participating

rate was rather high in follow up; about 90% of those participating in baseline also participated in follow up studies.

A pilot study in 2011 in Fin-HIT-study (www.finhit.fi), including genetic sample and permission to link to several registers, tried to recruit 11 y olds by an invitation letter to children's guardians. The final RR was very low (RR 12%). Reminders sent by mail or by telephone did not markedly increase the RRs in the pilot. A dropout study of this pilot showed that the main reason why children did not participate are parents' lack of time, parents are not interested to participate, or not willing to have their child participating. Very few mentioned genetic tests or linking to registers as a reason.

Recruitment of 13 y old students in a health promotion research project focusing on empowerment, food and physical activity habits. Abstract by Maja Wiberger, University of Gothenburg

The "How to Act?" research project is an ongoing health promotive school intervention, aiming to investigate how to support motivation and empowerment to achieve and maintain healthy food- and physical activity and habits. In total 115 adolescents have been recruited from three schools. The main teachers have had an active part in the recruitment process, by informing and collecting informed consents. Two of the schools were defined as control schools and in these schools the participation rate was 65% compared to 100% at the intervention school. The success in recruiting students at the intervention school is likely to be explained by the strong support of the principal of the school to integrate the project in the school schedule as well as high commitment among the school staff and possible benefits for the participants.

The main advantage in cooperating with schools in recruitment of adolescents is from our experience that it is a way to reach out to many adolescents at the same time, and that students can motivate and support each other. Important to keep in mind when cooperating with schools is that principals are very busy and can be difficult to get hold of, that schools have a hectic schedule and that building a good relationship with teachers as well as students is essential.

Group discussion in pairs and plenary on recruitment issues

In the workshop participants were asked to discuss what to consider when recruiting adolescents for dietary surveys. Two questions were raised:

- What arguments should be used for motivating adolescents for participating?
- Which three main points on difficulties when recruiting adolescents was consider the most important?

Both own experience and what had been presented should be taken into consideration. The discussions were done pairwise and the participants wrote down keywords and delivered these to the organizers. Main issues from the pairwise discussions were presented in plenum.

The answers to the first question discussed (What arguments should be used for motivating adolescents for participating?) were subsequently divided into the following categories.

Recruitment design:

- Recruiting in a school setting is superior compared to other ways of recruitment
- Use negative consent instead of informed
- The researcher actively contact the participant (less effort from the participant)
- Give second chance to registrate

Recruitment communication:

- Personal contact (face-to-face)- consider the integrity
- Information targets: adolescents and caretakers
- Involve adolescents in study design
- Proper description. Short, concise, relevant and easy to understand. If lengthy add appendix. Motivate responsibility
- Communication at individual level (What's in it for me?)
- Ensure supportive environment: teachers and study personnel
- Reminders

Motivation arguments:

- Being part of important research. What have others learned by participating?
- Explain why their participation is important
- Important to emphasize that the meaning of the survey is important, you are being heard
- Make the actual participation (as well as the research gain) a motivation. This experience adds to everyone's learning development
- Feedback - Including personal advice and knowledge of own lifestyle and habits
- Gain individual time to discuss with adults
- Obtain knowledge on own lifestyle and habits
- Winning a present – rewards
- A lesson about diet for the school class
- Invite celebrities – to motivate participation
- Competition between different schools (+ certificate)
- Have fun with friends

- Peer pressure
- Reminders
- Show results at group level – anonymous at individual level

The answers to the second question discussed (Which three main points of difficulties when recruiting, do you consider the most important?) were divided into the following categories:

- **Motivation** of adolescents/teachers/schools. Fail to make it fun and relevant. Negative influence from peers, they are too busy, too many research projects at schools, negative attitude caused by former research projects. If there are too many activities like blood samples or if it's time-consuming like dietary assessment for several days
- **Consent** Informed consent from legal guardians until 18. The informed consent is too heavy to read because of the requirements set by the ethical committee and laws. Accessibility and privacy
- **Lack of time/ resources** for reminders, being present at schools, blood samples
- **Get unbiased sample** Get the best schools without compromising the random sample, inclusion of all groups – ethnicity, unmotivated

Others:

- Difficult to recruit control schools
- Language
- Reminder not always possible

Second theme: Dietary methods tailored to adolescents

Six presentations were planned to give insight into experiences with use of various dietary assessment methods in surveys and studies. The first presentation on “General thoughts on making web-tools for adolescents” was unfortunately cancelled due to illness. Abstracts of the five remaining presentations are reported in the following paragraphs.

WebDASH – Development of dietary assessment tool for 10-11 y olds. Abstract by Anja Biloft-Jensen, Technical University of Denmark

Assessing dietary intake in children is a challenge and assessment tools should be intuitive, easy and fast to complete, non-intrusive, engaging, and age-appropriate. A Web-based Dietary Assessment Software for Children (WebDASH) was developed and evaluated by the Danish National Food Institute. It was part of the OPUS project measuring dietary intake through 3 periods (baseline, control, intervention) in a school-based intervention. The development was guided by focus groups, expert input, literature review, and usability tests. Special consideration was given to age-appropriate software design issues with an animated armadillo as a guide.

It was well tested during development and extensively validated, both during pilot study and the real study (Energy, fruits and vegetables, fish and wholegrain), using biomarkers and observation. Differences in validation results show that dietary reporting was more precise during the pilot study compared to the real study (80% vs 60% reporting matches of school lunch). This difference could be due to the outsourcing of the personal instruction in the real study to a company that was not well suited to complete the task and did not have time to conduct the “hands on” instruction required.

Technology based dietary assessment (TBDA) is often thought of as a solution to getting rid of expensive interviewers, expensive paper, mail, processing personnel etc. But TBDA is not self-propelled. It is a way to advance dietary assessment – getting better data (can make it standardized, more detailed, more portion sizes photos, incorporate automated prompts, send reminders, a tailored layout, photos, speech, sound).

Take home messages

- Make dietary assessment tools as flexible as possible, to be able to set up the tool to different target groups.
- Make them easy and intuitive. Max completing time 20 minutes
- Make participants understand, that the method has to be standardized, so everyone record their diet the same way (e.g. use the same portion size aids etc.)

- Give “hands on” personal instructions to participants by well trained professional personnel
- Provide a hotline where participants can get help if getting stucked

Development, implementation and evaluation of a smartphone dietary assessment application among 15 year olds in Sweden.

Abstract by Christel Larsson and Åsa Svensson, University of Gothenburg and Umeå University

Traditional methods as e.g. FFQ, 24h-recalls and diet history interviews are laborious and time consuming and may lead to low participation, high drop out and inadequate validity of dietary data. Methods using new technology may be a way to go further and 11-15 y old seems to prefer methods based on new technology compared with traditional ones. Using a digital camera to take photos during food records (16 days in total at 7 occasions) among overweight and obese children, showed good reproducibility but inadequate validity compared with measured energy expenditure with SenseWear armband. Reporting accuracy relative to TEE was lower for girls than boys and on weekdays compared with weekend days. Variables negatively associated with reporting accuracy relative to TEE were increased age and BMI z-score. In 2012/13 as many as 89% of 13–16 year olds in Sweden, owned a smartphone. Lessons learnt when developing a smartphone application for dietary assessment is that it ought to be development in collaboration with the adolescents and for both iPhone and androids. Furthermore doubly labeled water method ought to be used as reference method when evaluate its accuracy of assessing energy intake.

Can gamification influence food behavior in adolescent Finnish athletes? Abstract by Henna Vepsäläinen, University of Helsinki

The academic research concerning gamification, the use of game design elements in non-game context to motivate users, is scarce. We aimed to determine if the eating habits of adolescent athletes could be influenced using a game-like smartphone application. A total of 53 adolescent athletes were recruited to the BerryUp study and randomized to game and tutorial groups. The game group members kept visual food journals during the study period using a smartphone application. The meals, uploaded to the application, were given scores if specific food items defined in the rules were present. Tutorial group members took part in a small group meeting discussing healthy diet. Among the male athletes, both the gamified and the more conventional interventions triggered changes in food behavior. Among the female athletes, food behavior was already close to the recommendations in the beginning of the study. In the future, the two intervention methods could be combined to enhance the role of social support and enable individual tailoring.

The school as a setting for class room questionnaires and individual interviews among Swedish adolescents. Abstract by Agneta Sjöberg, University of Gothenburg

In the Gothenburg Adolescence Study we evaluated the effects on adolescent's iron situation in relation to iron fortification of sifted flour. A prerequisite was high participation and that adolescents of diverse backgrounds were proportionally represented. We chose a modified diet history method with questionnaires filled in during a lesson in the classroom combined with individual interviews (30-40 minutes) performed by research dietitians. Totally 2285 students in thirteen schools in Gothenburg, Sweden, were included in cross-sectional surveys in 1994 and 2000. Willingness to participate with blood sample was limiting for overall participation rate which still was 88%. The dietary history method was very positively received by the students. The individual interview may be a key to high participation in dietary assessments when information from representative groups is required. This is probably also valid today.

Investigating dietary habits and promoting health in Icelandic youth – challenges and opportunities when using IT-tools, apps and photos. Abstract by Anna S Olafsdottir, University of Iceland

In 2010, the Directorate of Health in Iceland initiated a “health promoting high schools” programme (HPHS). It is a holistic approach towards promoting health and preventing risk behaviour among youth involving stakeholders within school and in its surroundings. Our research team decided to use the opportunity, both to evaluate the programme as well as to perform a longitudinal study on the age group attending the

schools – that is 16-20 year olds. This is a difficult but interesting age group to study and there is a lack of longitudinal data focusing on this narrow age range. However, this is a crucial period in life full of changes in terms of physiological, psychological and behavioral factors, which may affect temporal and future health. We are especially interested in the associations of dietary intake and food related behaviour in association with fitness and body composition.

To our surprise it has been among the most difficult tasks to get the participants to respond to questionnaires even more than accepting to take part in quite extensive physical measurements. Among problems are getting signed consent from both participants and their parents, teacher involvement, place and timing of filling out the questionnaires as well as both personal problems like difficulty with reading from the screen, technical problems and use of e-mail or other means to send a user link. During our first data collection we ended up with adding some lists on paper for those needing it, and we decided to use paper for our first follow up, which scholars liked more. For the second follow up we are using a new web based questionnaire. This seems to be promising, but the important factors are that we ask them to complete the questionnaire during collection of the physical measures with computers we provide and us being present. Our presence and the personal feedback may also be an important factor.

The presentation also covered presentation of the development of a smartphone application that educates and motivates users to participate in evidence-based health promoting tasks and provides them with rewards in a variety of ways. The app will among others be tested in the setting of HPHS among youth in Sweden. Also the development and use of a photo method to estimate dietary intake in school canteens was presented. This is a part of the Norforsk funded study “Prospects for promoting health and performance by school meals in Nordic countries (Prommeal)”. Our method and the validation for the method is limited to schools meals, canteens or similar eating occasions where it is possible to have standards to base the nutrient calculations on. The method is promising since it has little participant burden and is relatively fast which is good in a stressful canteen setting. A paper is being written on the method.

Group discussion in pairs and plenary on methods suited for adolescents

The workshop participants were asked to extract and discuss **best practice on motivation** from the presentations as well as consider if there are experiences from their own research which supplies the results. The workshop participants were also asked to discuss **which minimum**

requirements a method should include in order to be interesting for adolescents to participate in?

The discussions were done pairwise and the participants wrote down keywords and delivered these to the organizers. Main issues from the pairwise discussions were presented in plenum.

The answers on best practice and own experiences in terms of motivation were subsequently divided into the following categories:

Use of new tools and new technologies

- Use the technique to improve existing methods but without relying only on or letting technique take over
- Difficult to keep track of a fast changing and evolving field that we are not experts in ourselves
- Technology-based tools need continuous updates, thus tools should be flexible/modifiable. In addition we need people/staff with programming/computer skills
- Important to collaborate with technicians who are updated on technical development – and the adolescents too!
- New technology in our eyes will never be new in youngsters eye, its a high cost for something that will be unmodern too soon
- Technique will not solve the problems. Technique requires more funding – takes a lot of time – then it is out of date
- A simple well-structured app where you can report food intake prospectively along the day is the best method
- It is very hard to estimate portion size from photos (or observations) even if you are a professional. But of course better than estimated portions

Combine tools and methods

- Can we combine a more personal factor/contact with IT
- Combine best app and photo method
- The combination of technology and interviews or face-to-face interaction
- Questionnaires must be combined with personal contact/interviews
- There are strengths and weaknesses by every method and how to combine these depends on the aim of the study and which output is needed

Personal contact

- 24h recall online but with the presence of a dietician during the first assessment. This enables the participant to ask questions and “get into the logics/rational” of the online tool
- Interviews should be emphasized when working with this population (adolescents) as they might need stimulation and guidance in recalling dietary habits/intake

- Face-to-face
- Personal contact, face-to-face important regardless of method
- One to one discussions are preferred by adolescents
- Face-to-face and follow up
- Personal – face-to-face interviewing/instruction the best for adolescents. Maybe better to aim for a smaller group. Interview based methods better for adolescents
- 24h recall option in >15 y for personal factor/by phone
- Important to give feedback to keep motivation

Study size

- Smaller studies with higher quality is to prefer
- By interviewing a small group of adolescents you can get large amounts of unique information when developing new methods
- Smaller data but more information and quality: interview/smaller groups – better info
- Smaller studies with richer data (more context bound) better than large studies if the former have high participant rate
- Quality over quantity

Motivation factors

- Involving adolescents in development
- Gamification/competitions could be used as a motivation tool in dietary assessment studies at group level
- Add fun is always a good idea
- Apps must be adapted for different ages. For the oldest adolescents it must have a more “adult” approach
- Motivation (competition game in groups)
- It can be hard to motivate adolescents
- Maybe adults should be adults and not try to act as adolescents

Other issues

- Educate the ethical board – political process?
- The school environment can be positive or negative, due to peer attitude

The results from the group discussion of the second question “Which minimum requirements should a method include in order to be interesting for adolescents to participate in?” were as follow:

Recruitment

- Accessibility – reach to inform – school preferable
- We have to know how to reach them (what social media are they using, what is popular in terms of IT and also in food)

Motivation

- Why? Motivation? Access – school setting/sport clubs: smaller cities
- Design tailored to the group of interest
- Focus to get through with the question “What is in it for us (the participants)” – personal – for the society. Participants need to feel that we are interested in them
- Adolescents need to be involved in development and formulating questions -> know the user/participant
- Taking the adolescents perspective
- Meaningful questions
- Clear aims and information
- Involve the adolescents in the planning of the study
- Immediately catch an interest
- Emphasize the research aspect/purpose
- They have to see what’s in it for them. For some it’s enough satisfaction to be asked. Some need very concrete reasons
- Having to do with possibilities to change their own situation
- Peer pressure -> peer involvement + like in gamification (IF positive)
- Mixed methods to avoid boredom
- Feedback to the adolescents
- Free food given to participants
- Reward: Netflix, fitness class, some info and dietary advice
- Quick to do and give a reward -> something they enjoy (fitness class)

Method

- Duration max 20 min (if it is a questionnaire or record)
- Easily understood instructions (and rationale behind the method)
- Fast and easy, user friendly (keep it simple)
- Self-instructive, intuitive
- If longitudinal - new questions all time but need old to compare with
- Use pictures (instead of long texts)
- Up to date technique
- Easy to use and understand
- Clear information
- As little time consuming as possible
- Use of reminder in apps and other technical devices. Questionnaires etc. should not be too long and adolescents should be aware of the time needed to fill the rest of the questionnaire (progress bar)
- New technical methods, but needs to function well
- Self-instructive, fast, intuitive, simple, user-friendly: but personal connection
- Computer is not as common as smartphone.
- If using technical devices, call afterwards to ensure personal contact
- They want to do it right! – do their best
- Not too much burden, not too frequent assessments
- Anthropology – observe school classes?

Summing up of today's program by Ellen Trolle, Technical University of Denmark

The two themes, Recruitment and Dietary assessment method have been explored by interesting and informative presentations and discussions among the participants. Concrete experience and ideas were shared. In general the following were pointed out as important; taking the adolescents serious in the recruiting process, be in contact with the adolescents during the study and in the process of collecting the dietary data. In the communication with the adolescents it is important to take their perspective and to make sure that they have the possibility to express their point of views. It is also important to explain, why each of them is important for the study and why the objective of the survey or study is important.

New techniques can be used for assessing diet, but methods needs to be fast and easy. When doing surveys, the school is a good setting, but very dependable on stakeholders and dedicated teachers. Being present and informing participants is important in order to show genuine interest in the adolescents and the study. It seems as if recall methods and face to face interviews are methods well suited for adolescents.

Friday December 5th 2015

Third theme: Difficulties in measuring adolescent's diet

Sisse Fagt opened the workshop and gave a short overview of the program with five presentations. The theme considered issues that make it difficult to capture adolescent's dietary intake e.g. irregularity of meals or meals not eaten at home. This theme was considering the dietary habits of adolescents and describing why it is difficult to get valid data of daily food intake. Abstracts of the five presentations are reported in the following paragraphs.

Results from a Danish validation study in Nordic monitoring – what do adolescents answer when they participate in a survey with FFQ.

Abstract by Sisse Fagt, Technical University of Denmark

In 2009, a dietary validation study was conducted among children, adolescents and adults. The Danish study comprised adolescents aged 13-17 years (n=151) who both answered a short 15 item food frequency questionnaire (NFFQ) by telephone as well as recorded their foods in a seven day food record (FR). Agreement between NFFQ and FR (frequencies) showed low correlations in children and adolescents (but not worse than other studies). Agreement between NFFQ and macronutrients of interest (calculated from FR) showed good agreement, but better agreement for children and adults than for adolescents. Generally there

was low proportion of misclassification, implying that the NFFQ was able to rank participants into high or low consumption. To overcome the lower agreement for adolescents, it is suggested solutions could be more detailed instructions on how to answer, making the interview face-to-face and include portion sizes. Also it can be considered whether 24 h recall is a better method than FFQ for collecting dietary information among adolescents.

Assessing dietary data in children and adolescents in a European study – a challenge. Abstract by Gabriele Eiben, University of Gothenburg

A multicenter EU-study about identification and prevention of dietary- and lifestyle-induced health effects in children and infants (IDEFICS study), has been conducted between 2007 and 2012. Eight countries (Belgium, Cyprus, Estonia, Germany, Hungary, Italy, Spain, Sweden) with over 16 000 children between 2 and 9 years have been included. The continuation study IDEFICS.Family (I.Family) included even parents. Dietary data were obtained by a food frequency questionnaire (FFQ) and a computer based 24 h dietary recall. Parents or guardians and teachers reported children's food intake. The FFQ consisted of 43 food items clustered into 14 food groups. A major challenge was to collect dietary data for the meals eaten out of home. Besides the help of teachers we should consider younger children as self reporters. Even methodological solution can be used.

Adolescents' perceptions on food and eating – a qualitative study in the Riksmaten youth project. Implications for a web based diet method. Abstract by Anna-Karin Lindroos and Eva Warensjö, National Food Administration, Sweden

The next Swedish national dietary survey will be carried out in approximately 3000 adolescents in grade 2, grade 5 and second year in the gymnasium in 2016-17. Blood and urine samples will be drawn from about half of them. A new web based 24 h recall method is developed for the survey. Before starting the technical development of this method a face-to-face interview study was conducted with the aim to explore adolescents' perceptions on foods and eating. Twenty-three boys and girls in the target age groups participated. The study showed that there was a marked difference between the two youngest and the oldest age group, however the variability in knowledge about foods and drinks was large between girls and boys and between individuals. It also showed that the adolescents want to respond correctly but that some drinks and foods were easy to forget. All participants but one had a smartphone. The new web method was developed in the autumn 2014 and based on the interview study. The most important principles for the development was to make it easy to record foods and drinks and complete questions, split complicated questions into several simpler ones, support memory by including reminders and meet the adolescents in the smartphones. The

web method project was carried out as an interactive IT-project in close collaboration with interaction design experts, system developers and the dietary survey team. During the development the system was regularly tested and end users were involved in the testing to improve the design and user friendliness of the method.

Quality of meals eaten out of home among Norwegian 9- and 13 year olds. Results from the Ungkost-3 Pilot study. Abstract by Torunn Totland, University of Oslo

Adolescent meals are expected to be unstructured, unhealthy and commonly eaten out of home. The quality of main meals eaten out of home among Norwegian adolescents was investigated in a group of 13 year olds (n=190) from the Ungkost-3 pilot study. Data was collected with a web-based food record tool during 4 consecutive days. The results showed that a small proportion of breakfast and dinner meals were eaten out of home, and that most lunch meals were eaten at school. Main meals eaten out of home did not contribute with more energy than main meals eaten at home. However, lunch meals eaten out of home contributed with less energy from added sugar than meals eaten at home, and dinner meals eaten out of home contributed with more energy from added sugar. More energy from the food categories; bread, cheese, pizza/pie and soft drinks were eaten out of home, and less energy from milk/yoghurt, fruit and fish. Future collaborative work should discuss whether meals eaten out of home should be defined based on their physical eating location or the origin of the foods consumed.

How to assess the diet among students at Danish schools for vocational education? Implications for the design of the study.

Abstract by Charlotte Lehmann, Technical University of Denmark

Aim: Monitoring the diet of young (from 15 years) students on vocational college to determine if keyhole certification of the school canteen will affect the entire diet.

Summary of Experience:

- Communication method is essential, when working with young people. A combination of physical communication and communication on their level is preferable e.g. text messages and web based communication.
- Physical communication and contact is important to establish mutual confidence.
- Web based photo tools for diet data collection makes it easy for the target group that are not necessarily strong in text and numbers.
- The method must have at least one form of verification instrument to ensure quality of data and to pinpoint general errors. Photo based validation additionally gives a visual understanding of the meals, and is eminent in conveying the project.

- This target group needs several reminders. Thus, a well-developed communication system is essential.
- Instruction meetings and pilot testing could improve participation rate, involvement and could obstruct some of general errors.
- Engagement of contact persons in their natural environment facilitates the recruitment and general interest in the project.
- Under-reporting due to wrong estimations or forgetting parts of meal is a consistent problem.

Group discussions and plenary regarding possible future strategies in dietary surveys on adolescents to handle some of the questions rose.

The workshop participants were divided into five groups. The organizers had prepared five questions, one for each group. The groups had approx. 45 minutes to discuss, to document their discussion and be prepared to refer it in plenary.

Group 1 was asked to discuss the following question. **Which research questions need still to be answered?**

The results of Group 1:

Does personal contact give better data than self-administered/web based methods?

How to decrease selection bias regarding social economic status

What is the best reference period/method? How can we develop a valid and user-friendly method? Collaboration!

How can we be more humble when we communicate dietary data?

New biomarkers /easy to use (and non invasive?)

Group 2 was asked to discuss three points to remember in future surveys in order **to ensure high participation and compliance** when working with dietary studies in adolescents.

Results of Group 2:

Be there – show that you use your time/answer questions (both in school and other settings)

Be humble –use both open ended and closed questionnaires – we do not know all foods that people eat

Be professional – interviewers should know about foods/nutrition

24 h recall and personal contact might be best

Group 3 was asked to discuss three points to remember in future surveys in order to **ensure valid answers** when working with dietary studies in adolescents.

Results of Group3:

Involvement of target groups in the development and pretesting of method/questionnaire

Validation of method to ensure that our method give valid answers

Face to face interaction in the field

Furthermore Group 3 discussed issues that should be avoided in order to ensure valid answers. Their results were:

Too much burden

Too complicated

Negative peer influence

Boring instruments

Too long recall period

Group 4 was asked to discuss three points to remember in future adolescent dietary studies when planning **which setting to conduct the study in and some pros and cons of choosing different settings.**

The results of Group 4:

Points to remember (pros):

Clear research aim

Personal interaction

School – meet people that we normally do not meet

Points to remember (cons):

Irregular meal patterns

How to meet the fast moving food market to be covered in a questionnaire

School – difficult to get in, many other tasks are assigned to the schools

Adolescents – NOT ONE group

Group 5 was asked to discuss which considerations regarding which **design, instruction and settings** should be taken when working with specific groups of adolescents where dietary assessment may be extra challenging e.g. when food culture is not familiar to investigator or when motivation is very low.

The results of Group 5:

The research question is the most important

Avoid preconceptions – listen!

Questions about “special diet” – changes and vegetarian etc.

Gatekeeper

Test in smaller groups or use smaller samples

Goodbye by Ellen Trolle, Technical University of Denmark on behalf of the organizers:

The plenary presentation from this last group work gave an overview of the themes that had been discussed during the workshop. On basis of this the organizers will prepare a short report summing up from the workshop and if the speakers agree, the presentations will be available at the DTU website and the link will be send to the participants.

All workshop participants were recognized for their contributions to the group work and discussions, making it a very fruitful workshop.

Conclusion and perspectives

Planning and conducting surveys and studies that include dietary assessment is very challenging whatever the target group. However, adolescents constitute a difficult group to reach and to get valid dietary data from.

During the workshop important issues to consider or implement in surveys and studies targeting adolescents were pointed out.

Involvement and respect are important towards all target groups but it seems to be overseen and especially important with regard to adolescents. A list of factors which might increase the motivation for participation and completing a study is presented from the group discussions, see page 7-9 and 13-16.

The importance of personal contact was underlined both with regard to the recruitment and for conduction of dietary assessment. The participation shall not be too burdensome. Make it as simple as possible – but recognize that if participating the adolescents also want to produce meaningful data. Therefore it is important for both larger surveys and smaller studies to carefully plan the collection of data and limit it to what is need to have. It was also recommended always to consider if the large survey are needed or if smaller studies that is carefully planned and conducted would provide better data quality and be able to give answers to our research questions.

Tools that are based on new technological solutions might be useful but it was also pointed out that it is resource and manpower demanding to develop new technological solutions. It is important not to spend too much of the budget on the technical part, but to allocate enough resources for recruitment, feedback and other improvements of the dietary assessment method for getting valid dietary data.

Schools are valuable as settings for studies or recruitment units for surveys. It was pointed out that it was important to remember to inform and involve the surroundings at the school to insure positive peers and teachers etc. However, several participants mentioned that it is getting increasingly difficult to use schools as setting due to the workload at schools. In addition, for older adolescents several settings might be needed since they might be engaged at high schools, vocational educations, at worksites or as unemployed.

It emerged from the discussions that laws on data management and the requests from the research ethics committees often complicate the recruitment procedures. Furthermore, it differs both between the Nordic countries and within the countries. For instance there are differences with regard to how you may approach the participant and requests on obtaining written consent from one or both of the parents.

Finally, the workshop revealed needs for further research. It is obvious that increased Nordic research collaboration on the following topics would bring the research area forward and improve knowledge about dietary health promotion among adolescents:

- Development of valid and user-friendly dietary assessment methods, including implementation of new technological solutions and new biomarkers, easy to use and not invasive.
- Investigation of the implication of personal contact with adolescent's contra self-administered/web based methods.
- Investigation of methodological improvements to decrease selection bias regarding socio-economic status.

The participants expressed their enthusiasm for the workshop giving this possibility to share experience and discuss details of study design and tools, not only present results but also tell about the difficulties which normally never get published in scientific papers. There was a common wish to meet for similar Nordic workshops, as it had been very useful and fruitful to meet and discuss common problems. Development of a valid common method would be interesting to discuss. Future Nordic initiatives might be a vehicle for further discussions among the Nordic colleagues within the nutrition area. This might be possible in 2015, since The National Food Administration in Sweden was granted to proceed the collaboration between the Nordic countries.

Appendix 1. Program

Nordic Workshop on challenges of dietary assessment in adolescents

Thursday 4th to Friday 5th of December 2014

University of Gothenburg and the Department of Food and Nutrition, and Sport Science, Building C, Room CE04

Address: Läroverksgatan 5, Gothenburg

Program

Thursday December 4th

9.30-10.00 Registration and coffee

10.00-10.05 Welcome by Christel Larsson, University of Gothenburg on behalf of organizers

First theme: Recruitment of adolescents (20 min presentation including questions)

10.05-10.25 Participation rate among children and adolescents in Norwegian dietary assessment studies – our experiences. Anine Medin, University of Oslo

10.25-10.45 How adolescents in low socioeconomic status areas perceive recruitment to dietary survey - results from a qualitative study Maria Magnusson, University of Gothenburg

10.45-11.05 Recruitment of Finnish 9-11 y olds. Eva Roos, Folkhälsan Research Center

11.05-11.25 Recruitment of 13 y old students in a health promotion research project focusing on empowerment, food and physical activity habits. Maja Wiberger, University of Gothenburg

11.25-12.10 Group discussion in pairs and plenary on recruitment issues

12.10-13.00 Lunch (HK kitchen/dininghall)

Second theme: Dietary methods tailored to adolescents

13.00-13.20 General thoughts on making web-tools for adolescents. Lene Frost Andersen, University of Oslo

13.20-13.40 Webdash – Development of dietary assessment tool for 10-11 y olds. Anja Biloft-Jensen, Technical University of Denmark

13.40-14.00 Development of a smartphone dietary assessment application among 15 year olds in Sweden. Christel Larsson, University of Gothenburg and Umeå University

14.00-14.20 Implementation and evaluation of a smartphone dietary assessment application among 15 year olds in Sweden. Åsa Svensson, Umeå University and University of Gothenburg

14.20-14.40 Can gamification influence food behavior in adolescent Finnish athletes? Henna Vepsäläinen, University of Helsinki

14.40-15.00 Coffee break

15.00-15.20 The school as a setting for class room questionnaires and individual interviews among Swedish adolescents. Agneta Sjöberg, University of Gothenburg

15.20-15.40 Investigating dietary habits and promoting health in Icelandic youth - challenges and opportunities when using IT-tools, apps and photos. Anna S Olafsdottir, University of Iceland

15.40-16.30 Discussion in pairs and plenary on methods suited for adolescents

16.30-16.45 Summing up of today's program by Ellen Trolle, Technical University of Denmark

17-19 Mingling and dinner (HK kitchen/dining hall)

Friday December 5th

Third theme: Issues that make it difficult to capture adolescent's dietary intake e.g. irregularity of meals, meals not eaten at home

8.30-8.50 Results from Danish validation study in Nordic monitoring – what do adolescents answer when they participate in a survey with FFQ. Sisse Fagt, Technical University of Denmark

8.50-9.10 Assessing dietary data in Children and adolescents in a European study – a challenge. Gabriele Eiben, University of Gothenburg

9.10-09.30 Adolescents' perceptions on food and eating - a qualitative study in the Riksmaten ungdom project. Implications for a web based diet method. Anna-Karin Lindroos and Eva Warensjö, National Food Administration, Sweden

9.30-10.00 Coffee break

10.00-10.20 Quality of meals eaten out of home among Norwegian 9- and 13 year olds. Results from the Ungkost-3 Pilot study. Torunn Totland, University of Oslo

10.20-10.40 How to assess the diet among students at Danish schools for vocational education? Implications for the design of the study. Charlotte Lehmann, Technical University of Denmark

10.40-11.50 Group discussions and plenary regarding possible future strategies in dietary surveys on adolescents to handle some of the questions raised (Room CE11, CE13 and CE14 also available)

11.50-12.00 Goodbye by Ellen Trolle, Technical University of Denmark on behalf of the organizers

12.00-13.00 Lunch (HK kitchen/dininghall)