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EARNEST

EARly Nutrition programming- long term follow up of Efficacy and Safety Trials and integrated epidemiological, genetic, animal, consumer and economic research

Instrument: Integrated Project

Thematic Priority 5.4.3.1: Food Quality and Safety

Final public report on activity 2.1.3.

Title of activity: Harmonization of data collection and evaluation in European birth cohorts

Period covered from 15.04.2005 to 14.10.2010

Start date of project: 15.04.2005 Duration: 5,5 Years

Organisation Name of Lead Contractor for this report: FIMIM

Introduction and objectives

Adequate dietary quality is especially critical during pregnancy to optimize both maternal and child health. Studies conducted in industrialized countries report associations reported between maternal diet and numerous reproductive health outcomes.

Recent literature suggests that despite the absence of extreme deficiencies, there are potential short- and long- term health effects of key components of dietary intake during pregnancy among women in industrialized countries. In this activity of the EARNEST project, we describe differences in intakes across European countries, as well as among women with different socio-demographic and health profiles within countries, to better understand how disparities in dietary intake may influence health outcomes among European women. This analysis was conducted using existing data in recent studies of pregnant women from different regions of Europe. Despite the extensive research interest in potential health effects associated with exposures during pregnancy including diet, relatively little is known on the diet of pregnant women in Europe. This information could be used by both researchers and policymakers.

The analysis focuses on disparities among women characterized by tobacco use in pregnancy, age, education level, and pre-pregnancy weight status. General population studies indicate poor diet quality is often linked to these factors, but much less is known about these relationships during pregnancy. We focused on four broad food groups: fruits and vegetables, essential sources of micronutrients such as folate and antioxidants; meats, a major source of bioavailable iron as well as less beneficial compounds such as saturated fat; seafood, the main source of several essential fatty acids as iron and other micronutrients; and milk and yogurt, important contributors to adequate intakes of calcium in pregnancy. Results are summarized here for intakes of fruits and vegetables.

Methods

Participating studies: Potential partner studies were identified via the internet, with key resources including Google and PubMed searches using the keywords “diet” and “pregnancy”, as well as the www.birthcohorts.net website. Invitation letters were sent to principal investigators requesting interested parties to respond to a brief survey requesting basic study design information in order to assess their eligibility to participate. Ultimately, 15 studies from 4 regions were included. Five cohorts were included from **Northern Europe (**Denmark: DNBC; England: ALSPAC; Norway: MoBa; Scotland: SEATON; Sweden: ABIS), 3 from **Western Europe (**France: EDEN; Germany: LISA; Netherlands: Generation R), 4 from **Southern Europe (**Italy: GEPSII, Greece: RHEA, Portugal: Generation XXI, Spain: INMA) and 3 from **Central/Eastern Europe (**Poland-Krakow; Poland-Lublin: Austria: Vienna). The analysis includes information on 165,992 mothers/children.

Dietary data selection and standardization: The procedures on data selection and standardisation are described in detail elsewhere. We decided to focus on selected food groups readily amenable to standardization and relevant during pregnancy: (i) fruits and vegetables including juices; (ii) meats and meat products including poultry; (iii) seafood; and (iv) dairy products (excluding desserts). Complete results on all food groups are available but in this report, we only present results for fruits and vegetables.

Main Findings

There are clear regional differences in the intake of fruits and vegetables with highest intakes in Sothern European countries (Figures 1a to 1d). Lower intakes in some countries such as Italy or Spain are above the highest intakes in other such as England. There are also clear heterogeneous patterns within regions. For example, fruit and vegetable intakes among pregnant women in Norway are higher than those of other Northern European countries such as Denmark or England.

With the exception of most Southern/Mediterranean countries, where fruit and vegetable intakes were typically highest, median intakes were generally lower among smokers (Figure 1a), younger ages and particularly <20y (Figure 1b), less educated women (Figure 1c), as well as among those with higher pre-pregnancy BMIs (**Figure 1d**). These disparities in intake across these groups were generally about 40-70g/day—about half a serving daily. However, in some cases, differences in median intakes associated with these factors exceeded 90-100g/day, equivalent to a full vegetable serving or a small serving of fruit.

In contrast to the rest of Europe, in Southern countries where intakes were highest, maternal education was not strongly related to increased fruit and vegetable intakes (Figure 1c). In Spain and Portugal, fruit and vegetable intakes were markedly lower among smokers and younger women. However, these relationships were not observed in Italy or Greece. While in other regions a declining gradient in fruit and vegetable intakes was typically observed with increasing BMI, pre-pregnancy overweight and obesity were associated with lower reported intakes of fruits only in Greece.

Figure 1a. Fruit and vegetable intakes (gr/day) by smoking status in pregnancy

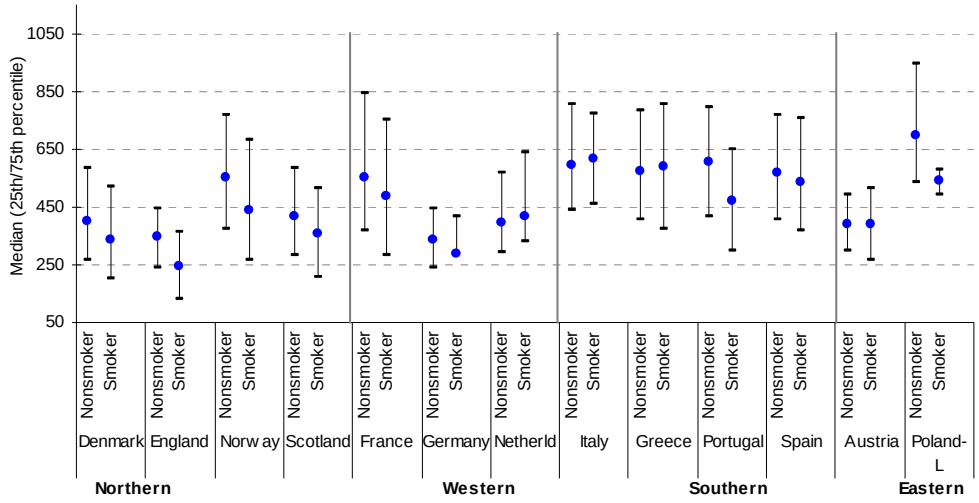
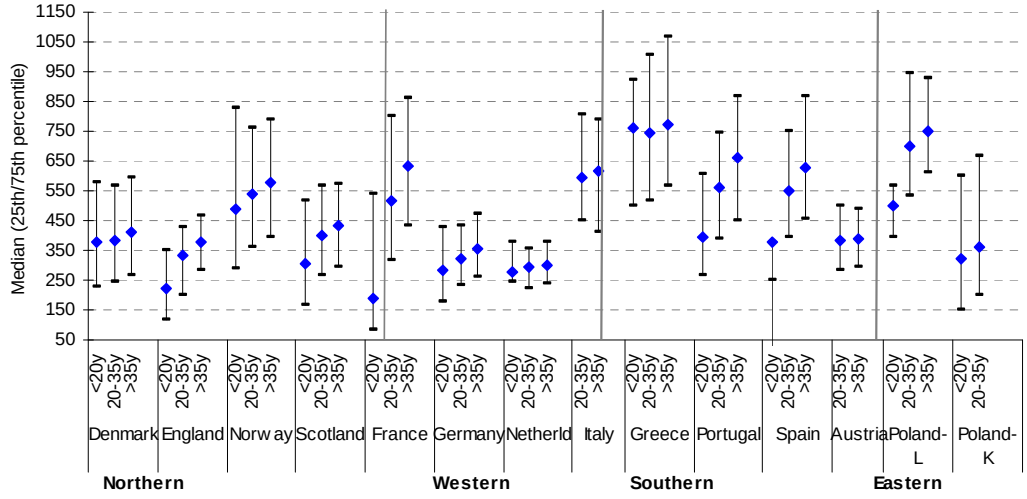
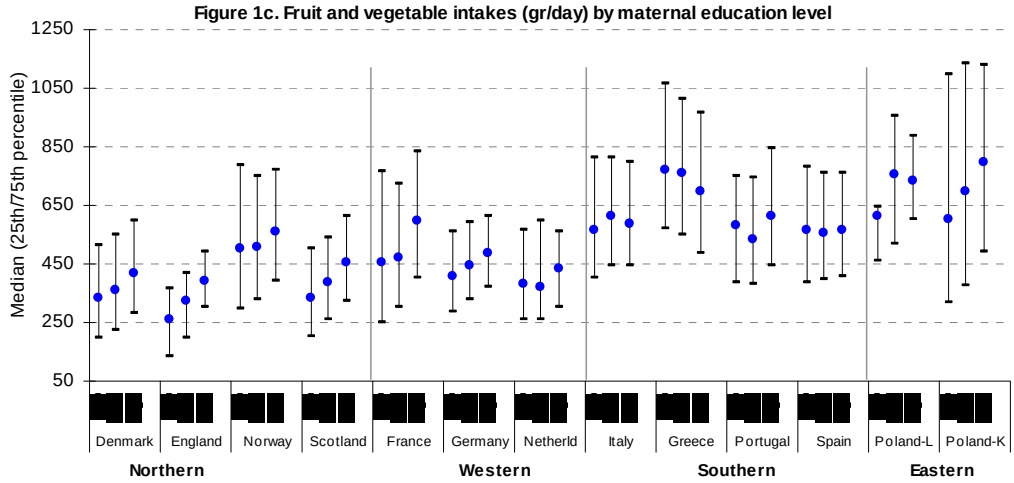


Figure 1b. Fruit and vegetable intakes (gr/day) by maternal age





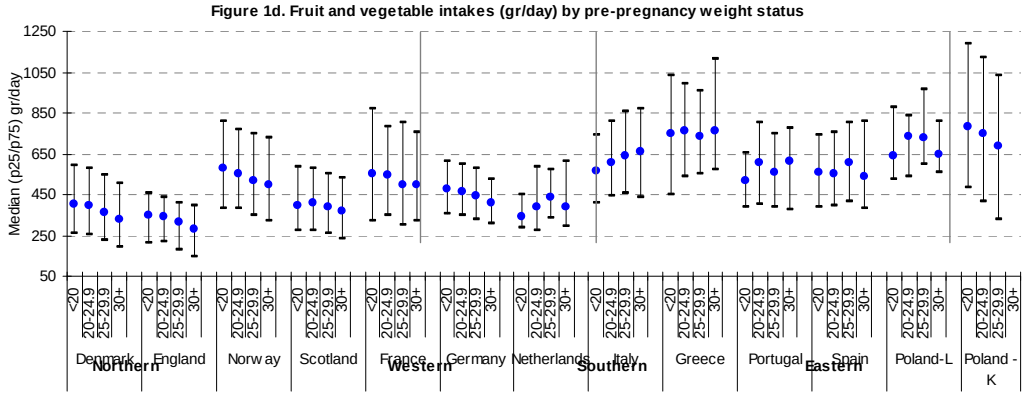


Figure 1 notes: Fruit excludes juices. Few subjects in strata for: Poland-Lublin smokers n=12; Poland-Krakow sample excluded smokers. Sweden excluded as intakes available only for vegetables.

Discussion

This study found wide differences in fruit and vegetable intake between and within European countries. Wide disparities in pregnant women's intakes of fruits and vegetables, as well as in meats and seafood (not shown here) were widespread, and were associated with several maternal characteristics predictive of poorer pregnancy outcomes. Although associations varied for individual food groups, disparities in intake consistently reflected poorer diet quality associated with smoking in pregnancy, younger age and less education. The magnitude of these intake disparities was often substantial, particularly for fruits and vegetables where differences were about one-half to a full serving per day. Mediterranean countries, where fruit and vegetable intakes were highest, were the most notable exception to typical patterns of disparity in intakes: fruit and vegetable intakes were not associated with maternal education in most countries from this region, and associations with pre-pregnancy BMI and maternal age were generally weaker and less consistent than elsewhere. For the fourth food group examined, milk and yogurt, there were few notable or consistent patterns of disparity in intakes. An important limitation of this study is that the data included may not always be representative of nationwide intake patterns, particularly for studies with small sample sizes or covering limited geographic locations. However, the similarity of intake levels with data reported in earlier multi-country studies suggests these data are useful for gaining insights on population habits.

This is the first study showing comparative, pan-European data on dietary intakes in this population with special dietary needs, and provides useful information for the development and targeting of

effective food-based dietary guidelines in Europe (European Food Safety Authority, 2006; World Health Organization, 2003). Overall, the results suggest potential benefits of targeting nutrition interventions to subgroups of women readily identified by these sociodemographic and lifestyle characteristics as a possible means to address inequalities in maternal health (Knight et al, 2009). Additionally, despite the emphasis on within-country intakes, marked differences in the typical levels of intakes across countries were evident. These disparities are important, as intake patterns must be interpreted within the context of overall levels of intake. The public health relevance of relatively lower consumption of fruits and vegetables, for example, is greater in settings where intakes are generally low. These pan-European data demonstrate that key dietary components co-vary with other risk factors related to reproductive health outcomes: diet may be an important confounder of, or an underlying contributing cause, linking these factors to reproductive health outcomes.