*Sakrapport till Naturvårdsverkets Miljöövervakning:*

# Regionala skillnader i intag av persistenta organiska miljögifter hos förstföderskor i Uppsala, Göteborg och Lycksele

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***Sammanfattning***

Under perioden 2000-2006 samlades bröstmjölk in från förstföderskor i Uppsala, Göteborg, Lund och Lycksele. Syftet med studien var att undersöka om det finns några regionala skillnader i halter av polyklorerade bifenyler (PCBer), klorerade pesticider (hexaklorbensen (HCB), ß-hexaklorocyklohexan (ß-HCH), oxyklordan, *trans*-nonaklor, DDT och DDT-metaboliter) och bromerade flamskyddsmedel (polybromerade difenyletrar (PBDE) och hexabromcyklododekan (HBCD)) i bröstmjölk. Resultaten visade att vissa signifikanta regionala skillnader i halter av de studerade substanserna förelåg. Skillnaderna var dock små, och inga säkra slutsatser om orsaker till skillnaderna kunde dras. Vissa regionala skillnader i halter av organiska miljögifter i livsmedel har också observerats. I en matkorgsstudie utförd 1999 (Darnerud *et al*. 2006) köptes livsmedel in i fyra olika städer i Sverige (Malmö, Göteborg, Uppsala och Sundsvall), och högre halter av ΣPCB, ΣDDT och ΣPBDE kunde ses i livsmedel från de södra delarna av Sverige i jämförelse med de norra. Denna tendens till nord-sydlig gradient observerades också i en senare matkorgsstudie som utfördes i samma städer 2005 (Ankarberg *et al*. 2006). Även den omfattande fiskundersökning som utfördes vid Livsmedelsverket 2000-2003 visade på regionala skillnader i halter i vissa fiskarter (NFA 2003).

Studien som redovisas i denna rapport syftar till att genom intagsberäkningar undersöka om det finns regionala skillnader i exponering för organiska miljögifter (dioxiner, dioxinlika PCBer, PCB 153 och *p,p´*-DDE) från mat. Intagsberäkningarna grundas på en kostenkät, ifylld av mödrarna vid bröstmjölksinsamlingen, med frågor gällande konsumtionen av kött, fågel, fisk, mjölkprodukter, vegetabiliskt fett och ägg under året före graviditeten. Haltdata för de studerade substanserna i olika livsmedel hämtades från undersökningar och kontrollprogram vid Livsmedelsverket. De regionala jämförelser som gjordes inkluderade Uppsala, Göteborg och Lycksele. Den kostenkät som användes i Lund skiljde sig åt från de som användes i Uppsala, Göteborg och Lycksele. Resultaten från Lund kunde därför inte användas i denna undersökning.

Trots vissa skillnader i konsumtionsmönster mellan de olika regionerna kunde inte några skillnader i intag av miljögifterna påvisas. Det beräknade medianintaget av dioxiner och dioxinlika PCBer varierade mellan 0,9 och 1,2 pg WHO-TEQ/kg kroppsvikt/dag, mellan 1,3 och 1,9 ng/kg kroppsvikt/dag för PCB 153 och mellan 2,5 och 3,5 ng/kg kroppsvikt/dag för

*p,p´*-DDE. Fisk och skaldjur bidrog till den största delen av intaget av WHO-TEQ (52-61 %). Enligt beräkningarna hade 14 % av kvinnorna intagsnivåer som överskred EU's tolerabla veckointag för dioxiner och dioxinlika PCBer (14 pg WHO-TEQ/kg kroppsvikt/vecka). Livsmedelsverkets konsumtionsråd gällande fet fisk från Östersjön överskreds av 4 % av kvinnorna, och samtliga av dessa åtta individer fanns med bland dem som överskred TWI. Högexponerade individer karaktäriserades generellt av hög konsumtion av fisk och mjölkprodukter. Det finns inte någon tolerabel intagsnivå framtagen för icke dioxinlika PCBer (t.ex. PCB 153), så för dessa var det inte möjligt att göra några jämförelser. Ingen kvinna i studien överskred JECFA's tolerabla dagliga intagsnivå för DDT-föreningar (10 µg/kg kroppsvikt/dag). En osäkerhet i de beräknade intagsnivåerna är att det är mycket svårt att minnas och korrekt ange sin konsumtion av olika livsmedel under ett år tillbaka. Dessutom är det troligt att konsumtionen av lax från Östersjön är överskattad eftersom det är mycket ovanligt med sådan fisk i butik. De haltdata som använts i beräkningarna är medel- och medianhalter som kommer från olika analysprojekt vid Livsmedelsverket. Dessa halter kan skilja sig åt från de verkliga nivåerna i de livsmedel som kvinnorna konsumerat. Dessutom användes samma haltdata för samtliga kvinnor, och hänsyn togs alltså inte till eventuella regionala skillnader i livsmedelshalter. Trots dessa osäkerheter tyder resultaten på att svenska förstföderskor från olika delar av landet har exponerats för liknande nivåer av de studerade föreningarna.

En korrelationsanalys kunde inte påvisa några samband mellan de beräknade intagen av PCB 153 och *p,p´*-DDE och nivåerna av dessa substanser i bröstmjölk. Detta beror sannolikt till viss del på att bröstmjölkshalterna av persistenta organiska miljögifter speglar den totala exponeringen under livstiden, och inte bara exponeringen under det senaste året.

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# Regional differences in intake of persistent organic pollutants in primiparous women in Uppsala, Göteborg and Lycksele (Sweden)

## *Introduction*

Exposure assessment is an important part of risk assessment of environmental pollutants in food. In the Swedish population, food is the major source of exposure to persistent organic pollutants (POPs), such as dioxins (PCDD/Fs) polychlorinated biphenyls (PCBs) and chlorinated pesticides. Earlier studies have shown a tendency to regional differences in levels of these contaminants in food in Sweden. In a Market Basket study from 1999 (Darnerud *et al.* 2006), in which foods were sampled from four different regions in Sweden (Malmö, Göteborg, Uppsala and Sundsvall), a tendency to a north-south gradient was seen in some food groups. Higher levels of ΣPCB, ΣDDT and ΣPBDE were seen in the southern parts of Sweden. This tendency was also seen in a later Market Basket study, performed in the same cities in 2005 (Ankarberg *et al*. 2006). Also, in the extensive study on POP-levels in fish, 2000-2003, regional differences in POP-levels in certain fish species were seen (NFA 2003).

The EU Scientific Committee of Food evaluated the toxicity of dioxins and dioxin-like PCBs in 2000-2001 (EU-SCF, 2001). SCF decided to express the maximum tolerable intake as a weekly average of 14 pg total WHO-TEQ/kg bw, corresponding to 2 pg total WHO-TEQ/kg bw/day. Also the FAO/WHO Joint Expert Committee on Food Additives and Contaminants (JECFA) evaluated dioxins and dioxin-like PCBs in 2002 (JECFA, 2002). JECFA decided to express the maximum tolerable intake as a monthly intake of 70 pg/kg bw corresponding to approximately 2 pg/kg bw/day. The tolerable intake represents the intake level considered safe over a lifetime of consumption and was estimated with the use of safety margins from animal studies. The European Food Safety Agency (EFSA) evaluated the toxicity of non-

dioxin-like PCBs in 2005 (EFSA, 2005). EFSA concluded that it is impossible to distinguish effects of non-dioxin-like PCBs from effect of dioxin-like PCBs, and also concluded that data regarding the toxicity of non-dioxin-like PCBs were limited. Therefore, EFSA did not decide on a tolerable intake level for non-dioxin-like PCBs. The FAO/WHO Joint Meeting on Pesticide Residues (JMPR) revised the provisional tolerable daily intake for DDT-compounds in 2000 and decided on a provisional tolerable intake of 10 µg/kg bw/day (JMPR, 2000).

Recurrent measurements of levels of POPs in human breast milk have been made in the Uppsala region of Sweden since 1996, in order to estimate temporal trends in POP body burdens among pregnant and breast feeding women, and to estimate the intake of POPs by breast fed infants. In order to investigate possible regional differences in POP levels in Swedish breast milk, samples were collected from primipara mothers in Göteborg (on the west coast of Sweden) 2001, Lund (southern Sweden) 2003, and Lycksele (northern Sweden) 2003-2004 (Lignell *et al.* 2005). There were statistically significant differences in breast milk levels of PCB, chlorinated pesticides, PBDEs and HBCD between the four regions studied after adjustment of the results for personal characteristics that could influence breast milk levels. A tendency to a U-shaped south-north trend was observed, with the highest levels of PCBs and pesticides in Lund and Lycksele and with lower levels in Göteborg and Uppsala. However, regional differences in levels were substantially smaller than the individual variation within a region, indicating similar long-term exposure levels of organohalogenated persistent compounds among pregnant and nursing primipara women from different areas of Sweden.

In view of the observed regional differences in levels of POPs in food and in breast milk it is interesting to investigate if the intake differ between regions in Sweden. The aim of the present study was to evaluate regional differences in intakes of dioxins, dioxin-like PCBs, PCB 153 and *p,p´*-DDE, and to study if there are any correlations between intake levels and concentrations in breast milk.

***Material and methods***

Recruitment

*Uppsala:* Mothers were recruited among primiparas who delivered at Uppsala University Hospital from April 2000 to March 2001, from March 2002 to February 2003, from January to December 2004 and from January to December 2006. Women who delivered on randomly selected days during the first week of each month were asked to participate in the breast milk study. 2-3 mothers were recruited every month. In 2000-2001, 67 women were asked to participate in the study and 31 donated milk and answered the questionnaire. In 2002-2003, 49 women were asked to participate and 31 agreed. In 2004, 51 women were asked to participate and 32 agreed. In 2006, 97 women were asked to participate and 50 agreed to participate.

*Göteborg:* Mothers were recruited among women who delivered at Mölndal hospital in September and October 2001. At 10 occasions a nurse informed all available primiparas about the study. 77 mothers were informed about the study and 37 agreed to participate and later donated milk and answered the questionnaire.

*Lycksele:* Mothers were recruited among primiparas who were Swedish by birth and delivered at Lycksele Hospital from September 2003 to July 2004. Altogether, 62 healthy mothers who had normal deliveries were asked to participate and 39 mothers donated breast milk and answered the questionnaire.

Breast milk levels and food consumption data

The mothers sampled milk at home during the third week after delivery (day 14-21 post partum). Data on age, weight, lifestyle, medical history, dietary habits etc. of the mothers were obtained via questionnaires. The analysis of dioxins, dioxin-like PCBs, PCB 153 and *p,p´*-DDE in breast milk has been described earlier (Glynn *et al.* 2007).

A food consumption questionnaire, with detailed questions about consumption of meat, poultry, fish, dairy products, vegetable fat and egg during the past year, were mailed to all the participating women (see Appendix 1). The consumption of different foods was calculated by means of consumption frequencies and meal sizes.

Concentrations in food

The concentrations used in the intake calculations were mean or median values from different analytical projects conducted at the NFA. The same concentrations were used for all women, irrespective of living region. In case of concentrations below the limit of quantification (LOQ), half of LOQ was taken as an estimated value in the calculations.

Levels of dioxins and dioxin-like PCBs in sausages, paté, lean freshwater fish, tuna and sardines were obtained from analyses of foods from a market basket study in 1999 (Darnerud *et al*. 2006). Data on milk, butter, egg, game, beef, pork, liver, chicken and vegetable fat was obtained from the Swedish NFA's control program for dioxins 2003-2005 (Ankarberg *et al.* 2007), where the samples are taken from all over Sweden. Data on seafood, herring, mackerel, salmon, eel and cod were obtained from a NFA fish-project in 2000-2003 (NFA 2003).

Levels of PCB 153 and *p,p´*-DDE in milk, butter, pork, beef, game, chicken and lamb as well as levels of PCB 153 in liver and vegetable fat were obtained from the Swedish NFA's control programs for contaminants in 2000-2005. Data on PCB 153 and *p,p´*-DDE in pate, sausages and lean freshwater fish as well as data on *p,p´*-DDE in liver and vegetable fat was obtained from analyses of foods from a market basket study in 1999 (Darnerud *et al*. 2006). Data on PCB 153 and *p,p´*-DDE in egg was obtained from a market basket study in 2005. Levels of PCB 153 and *p,p´*-DDE in seafood, herring, mackerel, salmon, eel and cod were obtained from a NFA fish-project in 2000-2003 and from the Swedish NFA's control programs in 2000-2005 (Lind *et al.* 2002, Ankarberg *et al.* 2007). For all fish species included in this study, analyses were carried out on muscle tissue, except for herring where the muscle including skin was analysed (i.e. edible part).

The methods used for analysis of dioxins, dioxin-like PCBs, PCB 153 and *p,p´*-DDE in food samples have been described earlier (Ankarberg *et al.* 2007, Lind *et al.* 2002, NFA 2003).

Intake calculations

Dietary intakes of dioxins, dioxin-like PCBs, PCB 153 and *p,p´*-DDE were calculated by combining concentration data of the contaminants in the various food products, with consumption data from the questionnaires filled in by the mothers.

Statistics

Statistical analysis was performed using the GraphPad Prism, version 5 (GraphPad Prism software, San Diego, CA) or Minitab® 15 (2006 Minitab Inc.). Statistical comparisons were made using one-way ANOVAs (Kruskal-Wallis) with a non-parametric post-test (Dunn´s) or by Mann-Whitney-U-tests. Possible correlations between intakes and breast milk levels of PCB 153 and *p,p´*-DDE were investigated using Spearman's rank correlation.

## *Results and discussion*

Characteristics of the participants

Characteristics of the participating mothers are compiled in Table 1. Women who were not Swedish by birth were excluded from the study. Mothers from Lycksele were significantly younger than mothers from Uppsala and Göteborg (Kruskal-Wallis, Dunn´s $p<0.0001$).

Consumption data

For data on consumption of the different foods, see Table 2.

For the food groups vegetable fat and fatty Baltic fish, there were statistically significant differences in consumption over the years in the mothers from Uppsala. In 2002-2003, mothers from Uppsala consumed significantly more vegetable fat than in 2006 (Kruskal-Wallis, Dunn´s $p=0.0011$). The Uppsala mothers recruited in 2000-2001 and 2002-2003 had a significantly higher consumption of fatty fish from the Baltic Sea as compared to the mothers in 2006 (Mann-Whitney U-test, $p= 0.0010$ and $p= 0.025$ respectively).

Due to the differences in consumption of vegetable fat and fatty Baltic fish between the years in Uppsala, the consumption of these food groups among mothers 00 from Göteborg and Lycksele were compared with the consumption among Uppsala mothers recruited during the same time period. No differences in vegetable fat consumption were seen between Uppsala (2000-2002) as compared to Göteborg (2001) or between Uppsala (2003-2004) and Lycksele (2003-2004). Comparisons of consumption of fatty Baltic fish between regions showed a significantly higher consumption in Uppsala (2000-2002) as compared to Göteborg (2001) (Mann-Whitney U-test, $p= 0.015$). No differences in fatty Baltic fish consumption were seen between Uppsala (2003-2004) and Lycksele (2003-2004).

Regarding the consumption of other foods than vegetable fat and fatty Baltic fish, there were no statistically significant differences in consumption rates among the mothers from Uppsala. Therefore, all data from the mothers in Uppsala (irrespective of sampling year) were used in the statistical comparison with Göteborg and Lycksele. The mothers in Lycksele consumed more dairy products (expressed as milk fat), non-Baltic fatty fish and game, than the mothers in Uppsala and Göteborg (Kruskal-Wallis, Dunn´s $p < 0.05$). Furthermore, mothers from Lycksele consumed less lean fish than mothers in Uppsala and Göteborg (Kruskal-Wallis, Dunn´s $p < 0.05$). When the consumption was calculated as consumption/kg body weight, there were no differences in consumption of fatty fish, due to a higher weight in the mothers from Lycksele.

There are uncertainties in the results since it is difficult to correctly answer questions about food consumption. Also note that the consumption of fatty Baltic fish among the mothers might be slightly overestimated, due to over-reporting of consumption of Baltic salmon (Ankarberg & Petersson Grawé 2005).

Intake calculations

Mean, median and 95$^{th}$ percentile of the dietary intake of dioxins, dioxin-like PCBs, PCB 153 and *p,p´*-DDE are shown in tables 3-7.

Despite differences in consumption of different food groups, there were no significant differences in total WHO-TEQ-intake between regions or years. Median dietary intake of dioxins and dioxin-like PCBs in this study ranged from 0.9 to 1.2 pg total WHO-TEQ/ kg bw/day (see Table 3). Contribution from different food groups (%) to total WHO-TEQ intake is given in tables 4-7. Fish and shellfish contributed with 52-61% to the total intake, dairy products with 18-27% and meat with 9-13%. The calculated intake of dioxins and dioxin-like PCBs are in agreement with an earlier intake calculation for primiparas who lived in Uppsala County and delivered in 1996-99 (Glynn *et al.* 2006). In that study, the median total TEQ intake was 0,9 pg/kg bw/day. The present results are also in agreement with an intake calculation for women (17-40 yrs) from the national food survey Riksmaten 1997-98 (Becker and Pearson, 2002), where the median total WHO-TEQ intake was 0.9 pg/ kg bw/day (Ankarberg and Petersson Grawé, 2005).

According to the current intake calculations, 14% of the women had intake levels above EU's tolerable weekly intake (TWI; 14 pg WHO-TEQ/kg bw/week for dioxins and dioxin-like PCBs). The NFA dietary advice regarding fatty fish from the Baltic Sea was exceeded by 4% of the mothers, and these eight individuals were all among the 14% who exceeded the TWI. Highly exposed individuals were generally characterized by a high consumption of fish (especially non-Baltic fatty fish) and dairy products.

There were no differences in PCB 153- or *p,p´*-DDE-intake between regions or years. Median dietary intake of PCB 153 in this study ranged from 1.3 to 1.9 ng/kg bw/day, and the intake of *p,p´*-DDE ranged from 2.5 to 3.5 ng/kg bw/day (see Table 3). The calculated intakes of PCB 153 and *p,p´*-DDE are in agreement with an earlier intake calculation for primiparas who lived in Uppsala County and delivered in 1996-99 (Glynn *et al.* 2006). In that study, the median PCB 153 and *p,p´*-DDE intake was 1.5 and 3.1 ng/kg bw/day respectively. The present results are also in agreement with an earlier intake calculation for women (21-30 yrs) from the national food survey Riksmaten 1997-98 (Becker and Pearson, 2002), where the median PCB 153 intake was 1.5 ng/kg bw/day, and the median *p,p´*-DDE intake was 2.5 ng/kg bw/day (Lind *et al*. 2002). No tolerable intake level for non-dioxin-like PCBs has been established, and no woman in the study exceeded JECFA's tolerable daily intake level for DDT-compounds (10 µg/kg bw/day) (JMPR, 2000).

There are uncertainties in the calculated intake levels. As mentioned earlier, the reliability of reported consumption levels may be questionable. Furthermore, the concentrations used in the intake calculations are mean or median values from different analytical projects conducted at the Swedish NFA. These concentrations may differ from the actual levels in the foods that the women consumed. Some regional differences in POP levels in food have been reported in market basket studies conducted at the NFA (Darnerud et al. 2006, Ankarberg et al. 2006, NFA 2003), but these differences were not taken into consideration in the intake calculations. Instead, the same concentrations were used for all women, irrespective of living region. Despite these uncertainties, the results indicate that primipara women from different regions of Sweden have been exposed to similar levels of the studied compounds from food.

<u>Correlations between intake and breast milk levels</u>

Levels of POPs in breast milk samples from Uppsala, Göteborg and Lycksele have been reported earlier (Lignell *et al.* 2005, Glynn *et al.* 2007). A correlation analysis showed no

significant correlations between the calculated intakes of PCB 153 and *p,p´*-DDE and the levels of the same compounds in breast milk (see Figure 1-2). The lack of correlation between calculated intakes and levels of PCB 153 and *p,p´*-DDE in breast milk may be explained by the fact that breast milk levels reflect the long-term exposure whereas the intake levels represent recent exposure. As discussed earlier, there are also uncertainties in the calculated consumption levels (see the section "Intake calculations" above).

## *Conclusions*

The present study shows that the median intakes of WHO-TEQs of dioxins and dioxin-like PCBs and *p,p´*-DDE among Swedish mothers are well below the tolerable intake levels established by SCF and JECFA. However, in this study, 14% of the mothers had an intake of dioxin and dioxin-like PCB WHO-TEQ that was higher than the TDI and 27% of these mothers consumed more Baltic fish than the current dietary advice issued by the NFA. Highly exposed individuals were generally characterized by a high consumption of fish and dairy products.

No regional differences in intake of dioxins, dioxin-like PCBs, PCB 153 or *p,p´*-DDE were found in this study, although consumption patterns of certain foodstuffs differed. This intake calculation supports the results from the previous report about regional differences in breast milk concentrations of POPs, since no marked differences were seen in the intake of total-TEQ, PCB 153 or *p,p´*-DDE.

No correlations between the calculated intakes of PCB 153 and *p,p´*-DDE and the levels in breast milk could be established. One possible explanation to these findings is that breast milk levels reflect the long-term exposure whereas the intake levels represent recent exposure.

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***References***


Ankarberg E and Petersson Grawé K. 2005. Intagsberäkningar av dioxin (PCDD/PCDF), dioxinlika PCBer och metylkvicksilver via livsmedel. Uppsala: The Swedish National Food Administration 25-2005.

Ankarberg E, Törnkvist A, Darnerud PO, Aune M, Petersson-Grawé K, Nordqvist Y and Glynn A. 2006. Dietary intake estimations of persistent organic pollutants (dioxin, PCB, PBDE, chlorinated pesticides and phenolic compounds) based on Swedish market basket data and levels of methyl-mercury in fish. Uppsala: The Swedish National Food Administration 2006.

Ankarberg E, Aune M, Concha G, Darnerud PO, Glynn A, Lignell S and Törnkvist A. 2007. Riskvärdering av persistenta klorerade och bromerade miljöföroreningar i livsmedel. Uppsala: The Swedish National Food Administration 9-2007.

Becker W and Pearson M. 2002. Riksmaten 1997-98. Befolkningens kostvanor och näringsintag. Metod- och resultatanalys. Uppsala: The Swedish National Food Administration 2002.

Darnerud PO, Atuma S, Aune M, Bjerselius R, Glynn A, Petersson Grawé K and Becker W. 2006. Dietary intake estimations of organohalogen contaminants (dioxins, PCB, PBDE and chlorinated pesticides, e.g. DDT) based on Swedish market basket data, Food and Chem Tox. 2006;44: 1597-1606.

EFSA. 2005. Opinion of the Scientific Panel on Contaminants in the Food Chain on a request from the Commission related to the presence of non-dioxin-like polychlorinated biphenyls (PCB) in feed and food. The EFSA Journal, 2005; 284: 1-137.

EU-SCF. 2001. Opinion of the Scientific Committee on Food on the risk assessment of dioxins and dioxin-like PCBs in food. CS/CNTM/DIOXIN/20, Final. 30th may, 2001.

Glynn A, Aune M, Darnerud PO, Atuma S, Cnattingius S, Bjerselius R, Becker W and Lind Y. 2006. Studie av förstföderskor, Organiska miljögifter hos gravida och ammande, del 1: Serumnivåer. Uppsala: The Swedish National Food Administration 04-2006.

Glynn A, Aune M, Ankarberg E, Lignell S and Darnerud PO. 2007. Tidstrend 1996-2006: Polyklorerade dibenzo-*p*-dioxiner (PCDD) och dibenzofuraner (PCDF), polyklorerade bifenyler (PCBer), klorerade bekämpningsmedel och bromerade flamskyddsmedel i modersmjölk från förstföderskor i Uppsala. Uppsala: The Swedish National Food Administration 2007.

JECFA. 2002. Polychlorinated dibenzodioxins, polychlorinated dibenzofurans, and coplanar polychlorinated biphenyls. In: Canady, R. *et al* (Eds.), Safety Evaluation of Certain Food Additives and Contaminants. Report of the 57th Meeting of the Joint FAO/WHO Expert Committee on Food Additives and Contaminants. WHO Food Additives Series, vol. 48. World Health Organization, Geneva pp. 451-664.

JMPR. 2000. Pesticide residues in food 2000: DDT. http://www.inchem.org/documents/jmpr/jmpmono/v00pr03.htm.

Liem D, Fürst P and Rappe C. 2000. Exposure of populations to dioxins and related compounds. Food addit. Contam. 2000;17(4):241-259.

Lignell S, Darnerud PO, Aune M, Törnkvist A and Glynn AW. 2004. Polychlorinated biphenyls and chlorinated pesticides/metabolites in breast milk from primiparae women in Uppsala County, Sweden - levels and trends 1996-2003. Uppsala: The Swedish National Food Administration 2004.

Lignell S, Glynn A, Darnerud PO, Aune M, Bergdahl I, Barregård L and Bensryd I. 2005. Regional differences in levels of persisitent organic pollutants in breast milk from primipara women in Uppsala, Göteborg, Lund and Lycksele (Sweden). Uppsala: The Swedish National Food Administration 2005.

Lind Y, Darnerud PO, Aune M and Becker W. 2002. Exponering för organiska miljökontaminanter via livsmedel – Intagsberäkningar av ΣPCB, PCB-153, ΣDDT, p,p'-DDE, PCDD/F, dioxinlika PCB, PBDE och HBCD baserade på konsumtionsdata från Riksmaten 1997-98. Uppsala: The Swedish National Food Administration 26-2002.

NFA. 2003. Fish project. Interim report 1-5. http://www.slv.se/templates/SLV_Page.aspx?id=15889&epslanguage=SV

van den Berg M, Birnbaum L *et al*. Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environ. Health Perspect. 1998; 106:775-792.

***Table 1***. Characteristics of the mothers participating in the study.

| | Uppsala 2000-2001 | | | Uppsala 2002-2003 | | | Uppsala 2004 | | | Uppsala 2006 | | | Göteborg 2001 | | | Lycksele 2003-2004 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | Median | Range | N | Median | Range | N | Median | Range | N | Median | Range | N | Median | Range | N | Median | Range |
| Age of the mother (years) | 31 | 30.1 | 21-37 | 31 | 29.8 | 24-37 | 32 | 29.3 | 21-35 | 50 | 30.2 | 19-40 | 37 | 30.0 | 19-40 | 39 | 27.1 | 19-35 |
| BMI before pregnancy ($kg/m^2$) | 31 | 22.7 | 16-37 | 31 | 21.6 | 18-26 | 32 | 22.2 | 18-34 | 50 | 22.0 | 19-37 | 37 | 22.6 | 17-42 | 39 | 22.5 | 18-46 |
| Weight gain during pregnancy (%/week) [a] | 31 | 0.62 | 0.03-1.5 | 31 | 0.63 | 0.3-0.9 | 31 | 0.65 | 0.09-1.2 | 50 | 0.57 | 0.1-1.2 | 37 | 0.63 | 0.0-1.1 | 39 | 0.58 | -0.16-1.5 |
| Weight reduction from delivery to sampling (%)[b] | 30 | 9.2 | 1.3-17 | 29 | 8.2 | 3.1-17 | 31 | 10.8 | 4.5-17 | 50 | 8.8 | 3.6-17 | 36 | 9.6 | 1.5-19 | 39 | 9.0 | 0.0-14 |
| | N | % | | N | % | | N | % | | N | % | | N | % | | N | % | |
| Country of birth | | | | | | | | | | | | | | | | | | |
| Nordic | 29 | 94 | | 31 | 100 | | 32 | 100 | | 50 | 100 | | 36 | 97 | | 39 | 100 | |
| Non-Nordic | 2 | 6 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 1 | 3 | | 0 | 0 | |
| Smoking during pregnancy[c] | | | | | | | | | | | | | | | | | | |
| Non-smoker | 26 | 84 | | 25 | 81 | | 24 | 75 | | 43 | 86 | | 30 | 81 | | 31 | 79 | |
| Former smoker | 2 | 6 | | 2 | 6.5 | | 4 | 12.5 | | 4 | 8 | | 2 | 5 | | 5 | 13 | |
| Smoker | 3 | 10 | | 4 | 13 | | 4 | 12.5 | | 3 | 6 | | 5 | 14 | | 3 | 8 | |
| Education | | | | | | | | | | | | | | | | | | |
| Max 3-4 yr high school | 9 | 29 | | 9 | 29 | | 9 | 29 | | 8 | 16 | | 8 | 22 | | 23 | 59 | |
| 1-3 yr higher education | 8 | 26 | | 5 | 16 | | 6 | 19 | | 5 | 10 | | 15 | 40 | | 11 | 28 | |
| >3 yr higher education | 14 | 45 | | 17 | 55 | | 16 | 52 | | 37 | 74 | | 14 | 38 | | 5 | 13 | |

[a]% of weight before pregnancy/week of pregnancy.
[b]Weight reduction minus birth weight of the child in % of weight just before delivery.
[c]Women who stopped smoking before pregnancy are considered to be former smokers, and women who stopped smoking during the first or second month of pregnancy are considered to be smokers.

***Table 2.*** Mean, median, 5th and 95th percentile of consumption of different foodstuffs in mothers from Uppsala, Göteborg and Lycksele.

| City (year) | Foodstuff | Mean (g/day) | Median (g/day) | 5/95 percentile | N |
|---|---|---|---|---|---|
| Uppsala (00-01) | Meat | 113 | 108 | 41/179 | 30 |
| Uppsala (02-03) | | 118 | 126 | 30/203 | 30 |
| Uppsala (04) | | 96 | 85 | 33/154 | 31 |
| Uppsala (06) | | 103 | 104 | 0/223 | 50 |
| Göteborg (01) | | 98 | 93 | 10/186 | 37 |
| Lycksele (03-04) | | 113 | 112 | 43/175 | 39 |
| **Total** | | **106** | **105** | **15/192** | **217** |
| Uppsala (00-01) | Dairy fat | 27 | 23 | 10/55 | 30 |
| Uppsala (02-03) | | 25 | 21 | 10/47 | 30 |
| Uppsala (04) | | 21 | 18 | 8/43 | 31 |
| Uppsala (06) | | 22 | 19 | 6/43 | 50 |
| Göteborg (01) | | 26 | 23 | 7/47 | 37 |
| Lycksele (03-04)[a)] | | 36 | 36 | 10/75 | 39 |
| **Total** | | **26** | **23** | **7/53** | **217** |
| Uppsala (00-01) | Vegetable fat | 24 | 19 | 5/55 | 30 |
| Uppsala (02-03)[b)] | | 23 | 26 | 9/33 | 30 |
| Uppsala (04) | | 19 | 18 | 9/31 | 31 |
| Uppsala (06) | | 15 | 14 | 0/29 | 50 |
| Göteborg (01) | | 20 | 17 | 8/35 | 37 |
| Lycksele (03-04) | | 18 | 14 | 12/32 | 39 |
| **Total** | | **19** | **17** | **4/34** | **217** |
| Uppsala (00-01) | Egg | 13 | 7 | 2/33 | 30 |
| Uppsala (02-03) | | 10 | 7 | 3/25 | 30 |
| Uppsala (04) | | 12 | 7 | 3/25 | 31 |
| Uppsala (06) | | 11 | 7 | 1/25 | 50 |
| Göteborg (01) | | 12 | 7 | 3/25 | 37 |
| Lycksele (03-04) | | 12 | 7 | 3/25 | 39 |
| **Total** | | **11** | **7** | **3/25** | **217** |
| Uppsala (00-01) | Fish (total) | 42 | 30 | 12/103 | 30 |
| Uppsala (02-03) | | 33 | 30 | 17/59 | 30 |
| Uppsala (04) | | 40 | 36 | 3/95 | 31 |
| Uppsala (06) | | 37 | 33 | 0/80 | 50 |
| Göteborg (01) | | 45 | 42 | 4/105 | 37 |
| Lycksele (03-04) | | 36 | 35 | 11/82 | 39 |
| **Total** | | **39** | **34** | **4/42** | **217** |
| Uppsala (00-01)[c, d)] | Fatty Baltic fish | 1 | 1 | 0/6 | 30 |
| Uppsala (02-03)[e)] | | 2 | 0 | 0/7 | 30 |
| Uppsala (04) | | 1 | 0 | 0/2 | 31 |
| Uppsala (06) | | 1 | 0 | 0/3 | 50 |
| Göteborg (01) | | 1 | 0 | 0/3 | 37 |
| Lycksele (03-04) | | 1 | 0 | 0/3 | 39 |
| **Total** | | **1** | **0** | **0/4** | **217** |

***Table 2.*** *Continuation.*

| | | | | | |
|---|---|---|---|---|---|
| Uppsala (00-01) | Other fatty fish | 12 | 6 | 1/41 | 30 |
| Uppsala (02-03) | | 8 | 8 | 1/19 | 30 |
| Uppsala (04) | | 10 | 5 | 0/32 | 31 |
| Uppsala (06) | | 11 | 9 | 0/35 | 50 |
| Göteborg (01) | | 10 | 9 | 0/19 | 37 |
| Lycksele (03-04) | | 16 | 14 | 1/45 | 39 |
| **Total** | | **17** | **9** | **0/35** | **217** |
| Uppsala (00-01) | Lean fish | 25 | 19 | 3/57 | 30 |
| Uppsala (02-03) | | 18 | 18 | 7/34 | 30 |
| Uppsala (04) | | 23 | 23 | 2/46 | 31 |
| Uppsala (06) | | 21 | 17 | 0/51 | 50 |
| Göteborg (01) | | 27 | 24 | 2/68 | 37 |
| Lycksele (03-04) | | 15 | 12 | 2/37 | 39 |
| **Total** | | **21** | **19** | **1/53** | **217** |
| Uppsala (00-01) | Shellfish | 3 | 1 | 0/9 | 30 |
| Uppsala (02-03) | | 5 | 6 | 0/11 | 30 |
| Uppsala (04) | | 6 | 6 | 0/14 | 31 |
| Uppsala (06) | | 4 | 6 | 0/13 | 50 |
| Göteborg (01) | | 7 | 6 | 0/14 | 37 |
| Lycksele (03-04) | | 3 | 2 | 0/7 | 39 |
| **Total** | | **5** | **4** | **0/13** | **217** |

[a)] Significantly different from Uppsala 2000-2006 ($p=0.0008$) and Göteborg 2001 ($p<0.05$).

[b)] Significantly different from Uppsala 2006 ($p=0.0011$).

[c)] Significantly different from Uppsala 2006 ($p=0.0010$).

[d)] Significantly different from Göteborg 2001 ($p=0.015$)

[e)] Significantly different from Uppsala 2006 ($p=0.025$).

***Table 3.*** Intake of dioxins and dioxin-like PCBs (total WHO-TEQ), PCB 153 and *p,p´*-DDE from food among mothers from Uppsala, Göteborg and Lycksele. There were no significant differences in intake between regions or years.

| **Intake** | **Uppsala 2000-01** | **Uppsala 2002-03** | **Uppsala 2004** | **Uppsala 2006** | **Uppsala total** | **Göteborg 2001** | **Lycksele 2003-04** | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| **Dioxins and dioxin-like PCBs** (pg WHO-TEQ/kg bw/day) | | | | | | | | |
| Mean | 1.4 | 1.4 | 1.2 | 1.1 | 1.3 | 1.3 | 1.4 | 1.4 |
| Median | 1.1 | 1.2 | 1.1 | 0.9 | 1.1 | 1.2 | 1.2 | 1.3 |
| 95th percentile | 3.4 | 2.7 | 2.2 | 2.2 | 2.7 | 2.4 | 3.6 | 3.2 |
| N | 30 | 30 | 31 | 50 | 141 | 37 | 39 | 217 |
| N>TDI | 7 (23%) | 4 (13%) | 3 (10%) | 6 (12%) | 20 (14%) | 4 (11%) | 6 (15%) | 30 (14%) |
| N>dietary advice | 2 | 3 | 0 | 2 | 7 | 0 | 1 | 8 (4%) |
| **PCB 153** (ng/kg bw/day) | | | | | | | | |
| Mean | 2.2 | 1.8 | 1.6 | 1.7 | 1.8 | 1.6 | 2.3 | 1.9 |
| Median | 1.6 | 1.4 | 1.3 | 1.4 | 1.4 | 1.6 | 1.9 | 1.5 |
| 95th percentile | 7.0 | 3.7 | 3.9 | 3.5 | 4.2 | 3.4 | 5.9 | 4.6 |
| N | 30 | 30 | 31 | 50 | 141 | 37 | 39 | 217 |
| ***p,p´*-DDE** (ng/kg bw/day) | | | | | | | | |
| Mean | 4.2 | 3.6 | 3.0 | 3.1 | 3.4 | 3.1 | 4.1 | 3.5 |
| Median | 2.9 | 2.9 | 2.5 | 2.7 | 2.7 | 2.7 | 3.5 | 2.8 |
| 95th percentile | 12.5 | 7.4 | 7.0 | 6.9 | 7.7 | 5.3 | 11.0 | 7.9 |
| N | 30 | 30 | 31 | 50 | 141 | 37 | 39 | 217 |

***Table 4.*** Dietary intake of dioxins and dioxinlike PCBs among mothers from Uppsala 2000-2006 (pg total WHO-TEQ/day).

| | Uppsala 2000-01 (N=32) | | | Uppsala 2002-03 (N=31) | | | Uppsala 2004 (N=31) | | | Uppsala 2006 (N=50) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Median | 95th perc | Mean | Median | 95th perc | Mean | Median | 95th perc | Mean | Median | 95th perc |
| Fish* | 53.7 | 40.8 | 169.0 | 51.1 | 39.0 | 130.1 | 45.5 | 39.5 | 115.1 | 44.3 | 36.9 | 119.8 |
| Meat and poultry | 10.2 | 8.2 | 25.7 | 9.4 | 9.4 | 16.1 | 7.7 | 7.2 | 14.7 | 7.2 | 7.3 | 14.8 |
| Dairy products | 16.4 | 14.2 | 33.4 | 15.9 | 12.9 | 29.0 | 13.3 | 11.6 | 26.5 | 13.2 | 11.8 | 26.1 |
| Vegetable fat | 8.2 | 5.9 | 17.5 | 7.6 | 9.5 | 9.9 | 7.0 | 8.8 | 9.7 | 5.7 | 8.8 | 9.2 |
| Egg | 0.9 | 0.5 | 2.3 | 0.7 | 0.5 | 1.8 | 0.8 | 0.5 | 1.8 | 0.8 | 0.5 | 1.8 |
| *Baltic fish | 14.7 | 10.7 | 66.9 | 16.4 | 0.0 | 75.2 | 6.2 | 0.0 | 19.9 | 8.0 | 0.0 | 29.1 |
| Other fatty fish | 23.4 | 13.3 | 79.0 | 16.1 | 14.0 | 37.7 | 18.2 | 10.6 | 64.1 | 18.6 | 17.3 | 44.9 |
| Lean fish | 15.0 | 10.4 | 35.6 | 10.0 | 9.4 | 19.4 | 11.3 | 10.4 | 22.9 | 10.1 | 8.4 | 24.5 |
| Shellfish | 3.9 | 1.9 | 11.7 | 8.7 | 7.6 | 18.1 | 9.7 | 7.6 | 25.3 | 7.7 | 7.6 | 21.2 |
| **Total intake** | | | | | | | | | | | | |
| pg/day | 89.3 | 75.7 | 211.0 | 84.7 | 79.0 | 171.2 | 74.0 | 67.1 | 146.3 | 71.4 | 61.9 | 153.6 |
| pg/kg bw/day | **1.4** | **1.1** | **3.4** | **1.4** | **1.2** | **2.7** | **1.2** | **1.1** | **2.2** | **1.1** | **0.9** | **2.2** |

***Table 5.*** Dietary intake of dioxins and dioxinlike PCBs among mothers from Uppsala 2000-2006 (pg total WHO-TEQ/day). N=144.

| | Mean | Median | 95:e perc | % contribution |
|---|---|---|---|---|
| Fish* | 48.0 | 39.1 | 131.7 | 56.8 |
| Meat and poultry | 8.4 | 7.9 | 17.1 | 11.4 |
| Dairy products | 14.5 | 12.7 | 28.7 | 18.4 |
| Veg fat | 6.9 | 8.8 | 10.4 | 12.7 |
| Egg | 0.8 | 0.5 | 1.8 | 0.7 |
| * Baltic fatty fish | 10.8 | 0.0 | 42.7 | 0.0 |
| Other fatty fish | 19.0 | 13.8 | 50.0 | 35.1 |
| Lean fish | 11.4 | 9.6 | 29.2 | 24.5 |
| Shellfish | 7.5 | 6.9 | 21.2 | 17.6 |
| **Total intake** | | | | |
| pg/day | 78.6 | 70.9 | 183.1 | |
| pg/kg bw/day | 1.3 | 1.1 | 2.7 | |

***Table 6.*** Dietary intake of dioxins and dioxinlike PCBs in mothers from Göteborg 2001. (pg total WHO-TEQ/day). N=32

| | Mean | Median | 95:e perc | % contribution |
|---|---|---|---|---|
| Fish* | 48.4 | 44.1 | 100.2 | 61.2 |
| Meat and poultry | 9.3 | 9.2 | 19.6 | 12.8 |
| Dairy products | 16.1 | 14.3 | 29.2 | 19.8 |
| Veg fat | 6.6 | 3.9 | 17.4 | 5.5 |
| Egg | 0.9 | 0.5 | 1.8 | 0.7 |
| * Baltic fatty fish | 5.8 | 0.0 | 29.7 | 0.0 |
| Other fatty fish | 15.9 | 13.9 | 42.0 | 31.5 |
| Lean fish | 14.6 | 13.4 | 40.7 | 30.3 |
| Shellfish | 11.0 | 7.6 | 30.1 | 17.1 |
| **Total intake** | | | | |
| pg/day | 81.3 | 81.7 | 142.4 | |
| pg/kg bw/day | 1.3 | 1.2 | 2.4 | |

***Table 7.*** Dietary intake of dioxins and dioxinlike PCBs in mothers from Lycksele 2003-2004 (pg total WHO-TEQ/day). N=32

| | Mean | Median | 95:e perc | % contribution |
|---|---|---|---|---|
| Fish* | 56.0 | 42.9 | 134.3 | 52.4 |
| Meat and poultry | 7.4 | 7.4 | 12.3 | 9.0 |
| Dairy products | 22.3 | 22.3 | 45.8 | 27.2 |
| Veg fat | 5.3 | 8.8 | 9.8 | 10.7 |
| Egg | 0.8 | 0.5 | 1.8 | 0.6 |
| | | | | |
| *Baltic fatty fish | 6.3 | 0.0 | 33.1 | 0.0 |
| Other fatty fish | 27.7 | 24.3 | 75.6 | 56.6 |
| Lean fish | 8.5 | 7.0 | 19.9 | 16.4 |
| Shellfish | 4.8 | 2.8 | 12.7 | 6.5 |
| | | | | |
| **Total intake** | | | | |
| pg/day | 81.5 | 73.2 | 187.7 | |
| pg/kg bw/day | 1.3 | 1.1 | 2.8 | |

***Figure 1.*** Correlation between concentrations of PCB 153 in breast milk (from primiparous mothers living in Uppsala, Göteborg and Lycksele) and the calculated intakes of PCB 153 during the year before pregnancy (N=197).

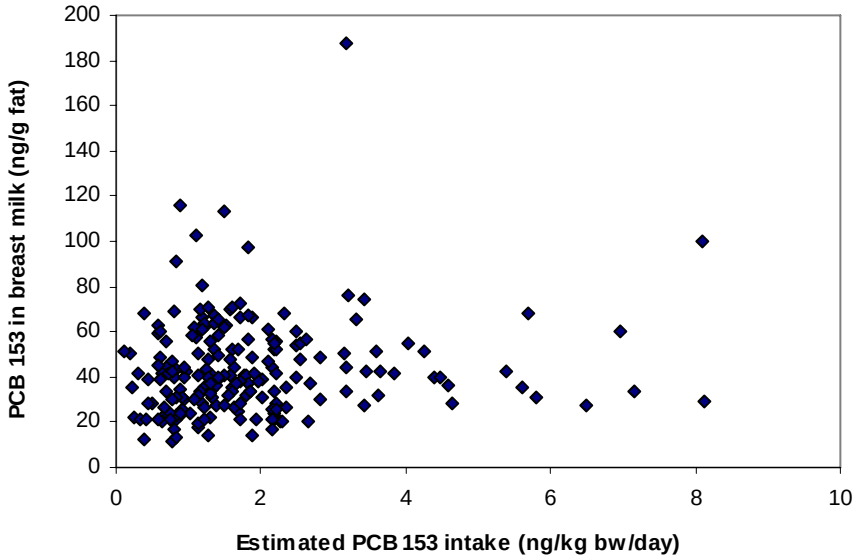
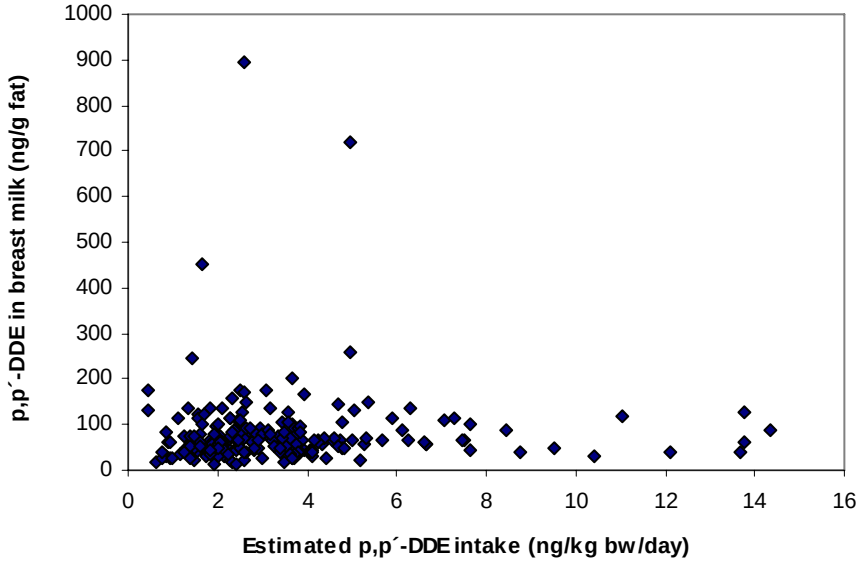



***Figure 2.*** Correlation between concentrations of *p,p´*-DDE in breast milk (from primiparous mothers living in Uppsala, Göteborg and Lycksele) and the calculated intakes of *p,p´*-DDE during the year before pregnancy (N=197).



***Bilaga 1***

Löpnummer_____

# FRÅGEFORMULÄR OM KOSTVANOR

Trender av miljöföroreningar i bröstmjölk

Livsmedelsverket

version 2005-12-05

## FRÅGOR OM DINA KOSTVANOR DE SENASTE 12 MÅNADERNA FÖRE DIN GRAVIDITET

***För att lättare komma ihåg denna period kanske det hjälper att tänka på om och var Du jobbade, om Du åt lunch på restaurang, favoriträtter o s v.***
Försök att ange Din normala konsumtion (hur ofta, hur mycket) av de olika livsmedlen eller maträtterna.

**1.** ***Vilken typ av mjölk eller fil drack eller åt Du vanligen (t ex till gröt, kräm, flingor, chokladdryck) och hur mycket per dag eller per vecka? (1 glas = ca 2 dl)***

| | | |
|---|---|---|
| Mjölk från egen gård | ____ glas/dag | ____ glas/vecka |
| Lättmjölk, minimjölk | ____ | ____ |
| Mellanmjölk 1,5% | ____ | ____ |
| Standardmjölk, 3% | ____ | ____ |
| Filmjölk,yoghurt,kefir | ____ | ____ |
| Lättfil, lättyoghurt | ____ | ____ |

☐ Jag drack eller åt sällan/aldrig mjölk

**2.** ***Hur många smörgåsar med smör eller margarin brukade Du äta per dag eller per vecka?***

____ skivor/dag ____ skivor/vecka

☐ Jag använde inget matfett på smörgåsarna -----> *Gå till fråga 5*

**3.** ***Hur brukade Du vanligen bre Dina smörgåsar?***

☐ Ganska tjockt lager fett
☐ Tunt lager
☐ Mycket tunt lager

**4.** ***Vilken typ av matfett brukade Du använda till smörgåsarna? Ange endast ett alternativ - det vanligaste.***

☐ Smör
☐ Bregott
☐ Margarin (t ex Flora, Runda bords, Lätta, Milda)

**5.** ***Vilka av följande pålägg brukade du äta på smörgås och hur mycket, per dag, per vecka eller per månad?***

| | Skivor/matskedar per | | |
|---|---|---|---|
| | dag | vecka | månad |
| Leverpastej, msk | _____ | _____ | ____ |
| Skinka, skiva | _____ | _____ | ____ |
| Nötkött, skiva | _____ | _____ | ____ |
| Älg, renkött, skiva | _____ | _____ | ____ |
| Korv, skiva | _____ | _____ | ____ |
| Kaviar, msk | _____ | _____ | ____ |

☐ Jag åt sällan eller aldrig något av dessa pålägg

**6.** ***Hur ofta åt Du i genomsnitt av följande livsmedel under de senaste 12 månaderna före din graviditet?***

*Sätt kryss i en lämplig ruta för varje livsmedel/maträtt:* ”Hur ofta”?.

| **LIVSMEDEL, MATRÄTTER (stekt, kokt, rökt)** | **HUR OFTA?** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Aldrig | Gånger per år | | Ggr/ mån | Gånger per vecka | | | | Gånger per dag |
| | | 3 | 6 | 1-3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| **KÖPT FISK inkl fisk på restaurang, matsal** | | | | | | | | | |
| Färsk eller djupfryst havsfisk (typ torsk, spätta, sej) | | | | | | | | | |
| Fiskrätter (fiskpinnar, fiskbullar m m) | | | | | | | | | |
| Sill (inkl. salt el. rökt sill) eller makrill från Västkusten | | | | | | | | | |
| Sillkonserver (inlagd, anjovis, matjessill m m) | | | | | | | | | |
| Tonfisk på burk | | | | | | | | | |
| Andra konserver (typ sardin) | | | | | | | | | |
| Strömming eller Östersjösill (Blekinge, Skåne) | | | | | | | | | |
| Böckling, rökt sill/strömming från Östersjön | | | | | | | | | |
| Odlad lax (ex norsk fjordlax) eller regnbåge | | | | | | | | | |
| Vildfångad lax, öring eller röding från Östersjön, Bottniska viken, Vänern och Vättern (finns sällan i butik) | | | | | | | | | |
| Röding eller öring från övriga vatten, sik | | | | | | | | | |
| Ål | | | | | | | | | |
| Gädda, gös, aborre, lake | | | | | | | | | |
| Färsk el. fryst tonfisk, stor hälleflundra, svärdfisk, haj eller rocka | | | | | | | | | |
| Stenbitsrom, löjrom, torskrom, kaviar på tub | | | | | | | | | |
| Lever av torsk eller lake | | | | | | | | | |
| Krabba | | | | | | | | | |
| Skaldjur, utom krabba (räkor, musslor m.m) | | | | | | | | | |
| **EGEN FÅNGST ELLER FÅTT** | | | | | | | | | |
| Makrill | | | | | | | | | |
| Vildfångad lax, öring eller röding från Östersjön, Bottniska viken, Vänern och Vättern (ej odlad) | | | | | | | | | |
| Odlad laxfisk | | | | | | | | | |
| Annan lax, regnbåge, röding, öring | | | | | | | | | |

| **LIVSMEDEL, MATRÄTTER (stekt, kokt, rökt)** | Aldrig | Gånger per år | | Ggr/ mån | Gånger per vecka | | | | Gånger per dag |
|---|---|---|---|---|---|---|---|---|---|
| | | 3 | 6 | 1-3 | 1 | 2 | 3-4 | 5-6 | 1 *el* mer |
| **forts. EGEN FÅNGST ELLER FÅTT** | | | | | | | | | |
| Sill från Västkusten | | | | | | | | | |
| Strömming eller Östersjösill (Blekinge, Skåne) | | | | | | | | | |
| Böckling, rökt sill från Östersjön | | | | | | | | | |
| Ål (kokt, stekt eller rökt) | | | | | | | | | |
| Annan färsk havsfisk, t ex plattfisk eller torsk | | | | | | | | | |
| Sik (kokt, stekt eller rökt) | | | | | | | | | |
| Gädda, gös, aborre, lake | | | | | | | | | |
| Lever av torsk eller lake | | | | | | | | | |
| Krabba | | | | | | | | | |
| Skaldjur, utom krabba (räkor, musslor m m) | | | | | | | | | |
| **MEJERIPRODUKTER, GLASS** | | | | | | | | | |
| Mjölk i matlagning i såser, pannkaka, mm | | | | | | | | | |
| Vispgrädde, mellangrädde såsom tillbehör, i maträtter, såser mm | | | | | | | | | |
| Kaffegrädde, matlagningsgrädde i maträtter, såser mm | | | | | | | | | |
| Gräddfil såsom tillbehör, i såser mm | | | | | | | | | |
| Creme fraiche  såsom tillbehör, i maträtter, såser mm | | | | | | | | | |
| Youghurt såsom tillbehör, i maträtter, såser mm | | | | | | | | | |
| Gräddglass | | | | | | | | | |
| **KÖTT, KORV, ÄGG** | | | | | | | | | |
| Korv (stekt, grillad, kokt) | | | | | | | | | |
| Griskött (stekt, grillat, kokt) | | | | | | | | | |
| Nötkött (stekt, grillat, kokt) | | | | | | | | | |
| Lammkött (stekt, grillat, kokt) | | | | | | | | | |
| Viltkött (älg, rådjur m m) | | | | | | | | | |
| Köttfärsrätt, köttbullar, pannbiff, köttfärssås mm | | | | | | | | | |
| Njure, lever (stekt, kokt, gryta) | | | | | | | | | |
| Kyckling, annan fågel (stekt, grillad, kokt) | | | | | | | | | |
| Ägg kokt/stekt, omelett, pannkaka, bakning mm | | | | | | | | | |

***Var snäll och kontrollera att Du kryssat i en ruta på varje rad i tabellen.***

## FORTS. DINA KOSTVANOR DE SENASTE 12 MÅNADERNA FÖRE DIN GRAVIDITET

***7. Vilken typ av ost brukade Du äta som pålägg och hur mycket per dag, per vecka eller per månad?***

| | Skivor/matskedar per | | |
|---|---|---|---|
| | dag | vecka | månad |
| Hårdost, 24-31% fett | ____ | ____ | ____ |
| Mager hårdost, 10-17% fett | ____ | ____ | ____ |
| Dessertost | ____ | ____ | ____ |
| Smältost (bredbar) (msk) | ____ | ____ | ____ |

☐ Jag åt sällan/aldrig ost -----> *Gå till fråga 9*

**8*. Hur tunna/tjocka brukade Dina ostskivor vara?***

☐ Tunna (en skiva per smörgås, skuren med osthyvel)
☐ Tjocka (flera skivor, eller skuren med kniv)

**9*. Hur många koppar kaffe/te drack Du vanligen per dag eller per vecka? (Kaffe = 1,5 dl, Te= 2 dl)***

Kaffe ____ koppar/dag ____ koppar/vecka
Te ____ koppar/dag ____ koppar/vecka

☐ Jag använde grädde i kaffet
☐ Jag använde mjölk i kaffet
☐ Jag använde mjölk i te

**10*. Vilken typ av matfett brukade Du/Din familj använda till matlagningen? Ange endast ett alternativ - det vanligaste.***

☐ Smör
☐ Bregott
☐ Margarin
☐ Olja
☐ Ister, flott
☐ Vi använde inget matfett till matlagning

**11. *Vilken typ av ost brukade Du/Din familj använda i matlagning? Ange endast ett alternativ - det vanligaste.***

☐ Hårdost, 24-31% fett
☐ Mager hårdost, 10-17% fett
☐ Dessertost
☐ Smältost
☐ Keso, kvarg m.fl.
☐ Vi åt sällan/aldrig ost

## NÅGRA ÖVERGRIPANDE FRÅGOR

**12.** ***Hur mycket åt Du i genomsnitt av följande fiskgrupper***

| | portioner per | | |
|---|---|---|---|
| ***A. de senaste 12 månaderna före din graviditet?*** | vecka | månad | år |
| - Mager fisk (ex spätta, torsk, gädda, produkter som fiskbullar, fiskpinnar o likn.) | _____ | _____ | _____ |
| - Norsk fjordlax (vanlig i butik), regnbågslax, makrill, sill (Västkusten, öppna havet) | _____ | _____ | _____ |
| - Strömming, sill från Östersjön (Blekinge, Skåne), böckling, vildfångad östersjölax eller havsöring (ovanlig i butiken!), ål | _____ | _____ | _____ |

**B. när du gick i årskurs 7 i grundskolan?**
***(försök att minnas genom att tänka på var du bodde vid denna tid, var du gick i skolan osv.)***

| | | | |
|---|---|---|---|
| - Mager fisk (ex spätta, torsk, gädda, produkter som fiskbullar, fiskpinnar o likn.) | _____ | _____ | _____ |
| - Norsk fjordlax (vanlig i butik), regnbågslax, makrill, sill (Västkusten, öppna havet) | _____ | _____ | _____ |
| - Strömming, sill från Östersjön (Blekinge, Skåne), böckling, vildfångad östersjölax eller havsöring (ovanlig i butiken!), ål | _____ | _____ | _____ |

**13.** ***Vilka grundläggande matvanor har du? Äter du vanligen***

☐ Blandkost, d.v.s. äter det mesta
☐ Ej kött, i övrigt blandkost
☐ Lakto-ovo-vegetarisk mat, d.v.s. vegetarisk kost plus ägg och mjölkprodukter
☐ Strikt vegankost, d.v.s. inga animaliska livsmedel alls
☐ Annan variant. Vilken?_____

## NÅGRA FRÅGOR OM DINA VANOR UNDER GRAVIDITET OCH EFTER FÖRLOSSNINGEN

**14.** ***Har du ändrat dina matvanor i samband med graviditeten?***

☐ Nej
☐ Ja
Om Ja, vilka är förändringarna? _____

**15.** ***Hur ofta åt Du följande fiskar under graviditeten? (kryssa för ett alternativ per fisk)***

| | Aldrig | ggr under grav. | | | ggr/mån | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1-3 | 4-6 | 6-8 | 1-3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| Gädda | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Lake | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Gös | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Abborre | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Ål | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Tonfisk (burk) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**16.** ***Hur många gånger har Du ätit följande fiskar efter förlossningen? (kryssa för ett alternativ per fisk)***

| | Aldrig | gånger efter förlossningen | | |
|---|---|---|---|---|
| | | 1-3 | 4-6 | 6-8 |
| Gädda | ☐ | ☐ | ☐ | ☐ |
| Lake | ☐ | ☐ | ☐ | ☐ |
| Gös | ☐ | ☐ | ☐ | ☐ |
| Abborre | ☐ | ☐ | ☐ | ☐ |
| Ål | ☐ | ☐ | ☐ | ☐ |
| Tonfisk (burk) | ☐ | ☐ | ☐ | ☐ |

***17.*** **Äter Du kött och/eller fisk?**

☐ Nej -----> *Gå till fråga 21*
☐ Ja

**18.** ***Hur ofta äter du stekta eller grillade kött- eller fiskrätter?***

| ggr/månad | | ggr/vecka | | | ggr/dag |
|---|---|---|---|---|---|
| 1 el. färre | 2-3 | 1 | 2-3 | 4-6 | 1 el. fler |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**19.** ***När du lagar mat hemma, använder du stekskyn till maten?***

☐ Alltid
☐ Hälften av gångerna
☐ Mindre än hälften
☐ Aldrig
☐ Vet inte

**20.** ***Vilken färg brukar det stekta kött du äter ha?***

☐ Brun-svart
☐ Mörkbrun
☐ Mellanbrun
☐ Ljusbrun

**21.** ***Hur ofta äter Du livsmedel baserade på sojaprodukter (sojaböna, sojabiff, tofu, sojadryck, mm)?***
**OBS! Gäller ej sojasås!**

| Aldrig | ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**22.** ***Hur ofta äter Du kålväxter eller maträtter innehållande kål (vitkål, broccoli, blomkål, rödkål)?***

| Aldrig | ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**23.** ***Vilken typ av salt använder du/ni vanligtvis i matlagning/bakning och vid matbordet hemma?***

Ange endast *ett* alternativ, det vanligaste.

☐ Joderat hushållssalt eller mineralsalt
☐ Hushållssalt utan jod
☐ Örtsalt, t.ex. Herbamare
☐ Vet ej/använder aldrig salt

Om Du/Ni använder salt hemma: Hur många gånger per dag i medeltal? _____gånger/dag

**24.** ***Har Du använt något vitamin/mineraltillskott efter förlossningen? (ex. Vitamineral, Vitaplex mineral, En Om Dan, C vitamin, Duroferon, Blutsaft, BlodtPlus, Ledins Komplett, Protektor, mm)***

☐ Nej ------->*Gå till fråga 25*
☐ Ja ---------->

Sort 1:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Sort 2:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Sort 3:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**25.** ***Hur Du använt något hälsokostpreparat eller kosttillskott efter förlossningen? (ex. Kelpprodukter, tångpreparat, viktminskningspreparat, sportprodukter, antioxidanter, jodtablett, ginseng, mm)***

☐ Nej ------->Gå till fråga 26
☐ Ja ---------->

Sort 1:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Sort 2:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Sort 3:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**26.** ***Har Du använt något läkemedel mot sura uppstötningar/"sur mage" efter förlossningen? (Novalucid Mixtur, Novalucol Mixtur, Novalucol Novum, Gaviscon, mm.)***

☐ Nej ------->Gå till fråga 27
☐ Ja ---------->

Sort 1:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Sort 2:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Sort 3:_____

| ggr/mån | | | ggr/vecka | | | | ggr/dag |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 1 | 2 | 3-4 | 5-6 | 1 el. mer |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## NÅGRA FRÅGOR OM AMNING

**27.** ***Hur har ditt barn ammats?***

***A. Helt*** ***B. Delvis*** ***C. Ammades ej***

*Fyll i vecka för vecka den bokstav som mest överenstämmer med hur barnet ammats, med början direkt efter förlossningen.*

vecka 1 _____ vecka 4 _____

vecka 2 _____ vecka 5 _____

vecka 3 _____ vecka 6 _____

Om barnet inte ammats helt: Varför fick barnet ersättning för bröstmjölk?

_____

Om barnet inte ammats helt: Vad fick barnet istället?

_____

## NÅGRA FRÅGOR OM DIN UPPVÄXT

**28.** ***Ammade Din mor Dig när Du var liten?***

☐ Nej -----> *Gå till fråga 29*

☐ Ja

☐ Vet ej -----> *Gå till fråga 29*

Om ja: Hur länge ammade Din mor Dig? _____månader ☐ Vet ej

**29.** ***På vilken plats bodde Du som längst under din uppväxt (upp till 18 års ålder)?***

Plats_____

Hur länge?_____år

**30.** ***Bodde Du vid kusten någon gång under uppväxten (upp till 18 års ålder)?***

☐ Nej -----> *Gå till fråga 31*
☐ Ja

Om ja: På ostkusten, sydkusten eller västkusten?_____

Om ja: På vilken plats?_____

Hur länge?_____år

**31.** ***Bodde Du i ett fiskeläge någon gång under uppväxten (upp till 18 års ålder)?***

☐ Nej ------->*Gå till fråga 32*
☐ Ja

Om ja: På vilken plats?_____

Hur länge?_____år

**32.** ***Var någon familjemedlem yrkesfiskare?***

☐ Nej
☐ Ja

**33.** ***Brukade någon familjemedlem fiska på fritiden?***

☐ Nej
☐ Ja

**34.** ***Vid vilken ålder flyttade Du hemifrån?*** _____års ålder

**35.** ***Har Du någon gång blivit behandlad för hårlöss, skabb, mm?***

☐ Nej -------> *Gå till fråga 36*
☐ Ja, _____ gånger

Preparatnamn: _____

Ungefär vilka år? 19_____, 19_____, 19_____, 19_____, 20____

Gällde behandlingen ☐ hela kroppen ☐ enbart huvudet

☐ Vet ej -------> *Gå till fråga 36*

**36.** ***Har Du sysslat med datorarbete i yrket eller hemma?***

☐ Nej
☐ Ja

Om ja: Hur länge? ___år _____månader _____veckor

Hur ofta? ☐ Ibland men ej dagligen ☐ 1-4 tim/dag ☐ Mer än 4 tim/dag

Vilket år var det sista Du sysslade med datorarbete? År 19_____ År 20_____

## STORT TACK FÖR DIN MEDVERKAN!

Intresserad av mer livsmedelsinformation, till exempel om kostråd under amningen?
Besök Livsmedelsverkets hemsida
www.Livsmedelsverket.se