FINAL SCIENTIFIC REPORT:

Social inequalities in early childhood health and development: a European-wide systematic review

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London, September 2014

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Executive summary

The research for Work Package 2 of DRIVERS ("Addressing the strategic Determinants to Reduce health Inequality Via 1) Early childhood development, 2) Realising fair employment, and 3) Social protection") focused on the scientific evidence for both the effect of social determinants on health and development in early childhood and effective interventions to reduce inequalities. This report addresses the three objectives of this Work Package, namely:

1. To conduct a systematic review on social inequalities, early child development and early child health;
2. To analyse and develop methodologies for interventions regarding unequal child development and health;
3. To provide analytic evidence using data from WHO-Europe member countries that helps to explain social inequalities in early child development and early child health, and identifies factors that would reduce health inequalities across the European region.

In the introductory sections we provide an overview of the background to this project and outline the theoretical framework used in this Work Package.

The first objective of the Work Package was accomplished by conducting a systematic review of the main findings of 201 studies from 32 countries in the European region on social inequalities in early child development and early child health. We demonstrate that multiple adverse social factors operating at both the household and neighbourhood level are independently associated with a range of adverse health and developmental outcomes throughout early childhood. The social gradient in health and developmental outcomes observed throughout the remaining life course may be partly explained by gradients initiated in early childhood, suggesting that prevention and early intervention are effective strategies to tackle the complex embedding, clustering and cumulative nature of social disadvantage in early life.

To address the second objective, another systematic review was conducted focusing on those interventions to reduce inequalities in health and development and their social determinants that have been carried out during early childhood in European countries over the last 25 years. We identified a total of 22 interventions from the medical, social sciences and grey literature, the majority of which were delivered in the UK and Ireland. The interventions aimed to improve early child development and health as an outcome. All but two interventions, where the improvements in some activities were not regarded as significant, had favourable outcomes. A total of 12 interventions had an impact on developmental outcomes and fewer had an impact on parenting or health.

To achieve the third objective, access to data from 13 European birth cohorts was obtained and analysed to evaluate the association between social disadvantage and a range of comparable health and developmental outcomes. This analysis ensured that the evidence provided covered a good geographic representation of the European region. This contributed to addressing the limitations in the amount of evidence available from studies outside a small group of European countries (principally in Scandinavia and the British Isles). Mother's education was found to have an appreciable impact on the risk of preterm and SGA births, and childhood asthma and overweight across European countries.

To provide an explanation of social inequalities in health and early child development, we have additionally undertaken an in-depth analysis of the largest of the birth cohorts. This focused specifically on interactions between socioeconomic characteristics at different levels (small area,

household and individual) and pathways using data covering multiple social factors operating at different societal levels. Finally, we brought together the findings from all the reviews and analyses undertaken as part of the Work Package into a single set of conclusions and recommendations for policy, practice and research. These are described in full in the final section of this report. In summary, the main conclusions and recommendations are: early years policies and interventions are required in all member states to tackle the adverse health and developmental outcomes that result from a multiplicity of social factors that operate during early years, we need to identify early at-risk families and refer them to appropriate services and we need to ensure that policies to increase the universality of access to high-quality, affordable, early years and child care are promoted. In terms of research, greater investment is needed in sustaining long-term, harmonised birth cohort studies so as to better understand the variation across the countries and regions of the European Union in the lifelong effects of early childhood conditions on health and developmental outcomes.

1. Background

The period of early childhood has been identified as a major driver of inequalities in health that exist throughout Europe. The importance of early childhood has been a focal point in the recommendations of the Commission on Social Determinants of Health (CSDH), the Strategic Review of Heath Inequalities in England post 2010 (Fair Society Healthy Lives: 'The Marmot Review') and the Review of Social Determinants and the Health Divide in the WHO European Region, among others. [1,2,3]. The evidence upon which these recommendations are based clearly identifies that health inequalities originate in the first years of life. The evidence suggests that social and structural factors have an enormous impact upon early childhood health and development. Given the heterogeneity of the social structure throughout Europe, it is essential to understand how social inequalities in early childhood health and development emerge across different settings [4].

Little is known about the extent to which social inequalities in childhood health and development differ in scale across Europe. Furthermore, it is not well understood how the mechanisms that explain these inequalities operate across different settings or the impact that programmes and policies, which aim to address social inequalities in early childhood, may have in different contexts. The purpose of the DRIVERS component on early childhood development is to address these three gaps in order to develop new evidence and inform future practice.

The role of biological, cultural, lifestyle, psycho-social and socio-economic factors which interplay with broader community and environmental determinants upon early childhood health and development are manifold [5]. Given these complexities, our work relies upon the key principles envisaged by the late Clyde Hertzman and colleagues [6]. Firstly, early child development is defined as the result of interactions between the children's biological factors and the environments into which they are embedded. Secondly, physical, socio-emotional and language/cognitive development rest upon environmental characteristics which may be either beneficial or harmful for children. Lastly, the opportunity to provide children with the best start in life depends upon how well these environmental factors may be targeted.

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1. M Marmot, J Allen, P Goldblatt, T Boyce, D McNeish, M Grady, I Geddes. Fair Society, Healthy Lives. "The Marmot Review". Strategic Review of Health Inequalities in England post-2010. 2010.

2. Commission on Social Determinants of Health, WHO. Closing the gap in a Generation. Health equity through action on the social determinants of health. Commission on Social Determinants of Health FINAL REPORT. Available at: http://whqlibdoc.who.int/hq/2008/WHO_IER_CSDH_08.1_eng.pdf. Accessed 8/2/2013.

3. UCL Institute of Health Equity. WHO. Review of social determinants and the health divide in the WHO European Region. 2013.

4. Gulland A. Health inequalities are worsening across Europe, says WHO. BMJ 2013;347:f6594.

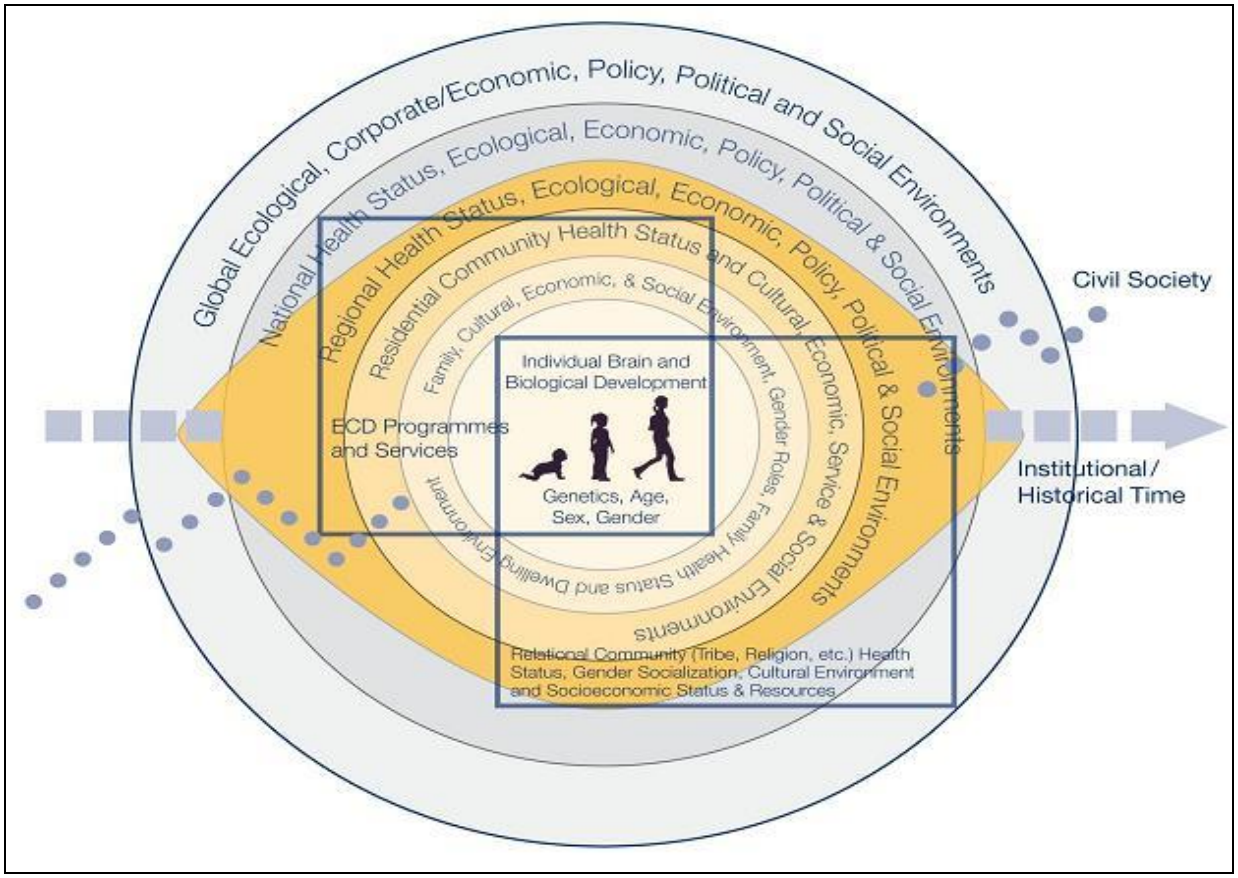
5. Lloyd, D, Newell, S & Dietrich, UC 2004, Health inequity: a review of the literature, prepared for Health Promotion Unit, Northern Rivers Area Health Service, Lismore, NSW.

6. Siddiqi A, Irwin L, Hertzman C. Total environment assessment model for early child development: Evidence report for the World Health Organization's Commission on the Social Determinants of Health. Vancouver, BC: Human Early Learning Partnership (HELP); 2007.

The influence of the environment on children from birth to later years emanates from different spheres of life and is depicted in Figure 1 [6]. This representation shows how children and their pre-determined characteristics are shaped by their family and dwelling sphere, the residential community sphere, the relational community and services sphere, as well as the broader regional and national environmental spheres. Each sphere is profoundly important for all aspects of early childhood health and development.

Thus, the DRIVERS component of the state of social inequalities in early childhood health and development in Europe, and efforts to reduce these, will draw from these relationships which influence children's outcomes.

Figure 1. Conceptual Framework of Early Child Development



Source: Siddiqi A, Irwin L, Hertzman C. (2007). [6]

2. Structure of the report

In this final scientific report of research undertaken in Work Package 2 ('Social inequities in early child health and development') of DRIVERS ("Addressing the strategic Determinants to Reduce health Inequality Via 1) Early childhood development, 2) Realising fair employment, and 3) Social protection"), we focus on the scientific evidence for both the effect of social determinants on health and development in early childhood and effective interventions to reduce inequalities. This report is structured around addressing the three objectives of this Work Package, namely:

1. To conduct a systematic review on social inequalities, early child development and early child health;
2. To analyse and develop methodologies for interventions regarding unequal child development and health;
3. To provide analytic evidence using data from WHO-Europe member countries that helps to explain social inequalities in early child development and early child health, and identifies factors that would reduce health inequalities across the European region.

In addition, we want to focus on providing an explanation of social inequalities in health and early child development.

Throughout the work within the DRIVERS project, we build on the knowledge base outlined above. In the first two parts of the Results section (Chapter 3), we summarise the outcomes of two systematic reviews conducted to (a) evaluate the findings from observational studies linking different measures of social inequalities on individual, household and small area level and different health and developmental outcomes in several stages of childhood and adolescence, and (b) evaluate the effects of interventions focusing on reducing inequalities in health and developmental outcomes within the European region. In the third part of the Results section, we focus on our own analyses of available European longitudinal datasets. These analyses are divided into two parts, with the first focusing on the role of maternal education in a wide range of outcomes (explained in more details in Chapter 3.3), and the second part assessing the roles of multiple social factors in selection of larger well-established cohort studies. In the final section, we draw together the findings from the research undertaken to provide recommendations on policy, practice and methodology relevant for governments and other institutions responsible for implementation across the EU and within EU Member States.

3. Results

3.1 Report on social inequalities in early child development and early child health (Milestone 2.2) (based on published review by Pillas et al., 2014)

Early childhood, defined as the period between prenatal development to eight years of age, is increasingly recognised as the most crucial period of lifespan development [7] and the most highly sensitive to external influences [8]. During this period, the foundations are laid for every individual's physical and mental capacities, influencing their subsequent growth, health, and development throughout the life course [9]. Although a large number of European-based studies exist which examine the relationship between specific social factors operating at different levels and health and developmental outcomes in early childhood, no study to date has attempted to systematically collate and synthesise the overall evidence provided. Hence, the objective of this study was to provide a systematic review and synthesis of all the relevant evidence linking social inequality to child health and developmental outcomes in the European region.

To carry out the review, the Medline database and CHICOS (a European child cohort inventory) were systematically searched to identify all European studies published in peer-reviewed journals within the last ten years.

A total of 201 studies from 32 European countries were included in the review (Figure 2). Although the number of countries represented is relatively large, there are no studies in many countries of the European region and some other countries are represented by one or two studies (Table 3). Most evidence comes from a very small number of studies including the United Kingdom, Scandinavia and the Netherlands. Our main findings show that neighbourhood deprivation, lower parental income/wealth, educational attainment, and occupational social class, higher parental job strain, parental unemployment, lack of housing tenure, and material deprivation in the household were identified as the key social factors. These were associated with a wide range of adverse child health and developmental outcomes. Similar trends in associations were observed across most European countries, with only minor country-level differences. A higher proportion of associations tended to be significant with increasing child age.

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7. World Health Organization Early Child Development Knowledge Network (WHO ECDKN). Early child development: A powerful equalizer. Final report of the Early Childhood Development Knowledge Network of the Commission on Social Determinants of Health. Geneva: World Health Organization. 2007.

8. Shonkoff J, Phillips D (Eds). *From neurons to neighbourhoods: The science of early childhood development.* Washington, DC: National Academy Press. 2000.

9. Gale CR, O'Callaghan FJ, Bredow M, Martyn CN; Avon Longitudinal Study of Parents and Children Study Team. The influence of head growth in fetal life, infancy, and childhood on intelligence at the ages of 4 and 8 years. *Pediatrics.* 2006;118(4):1486-1492.

Figure 2. Selection of studies for European review

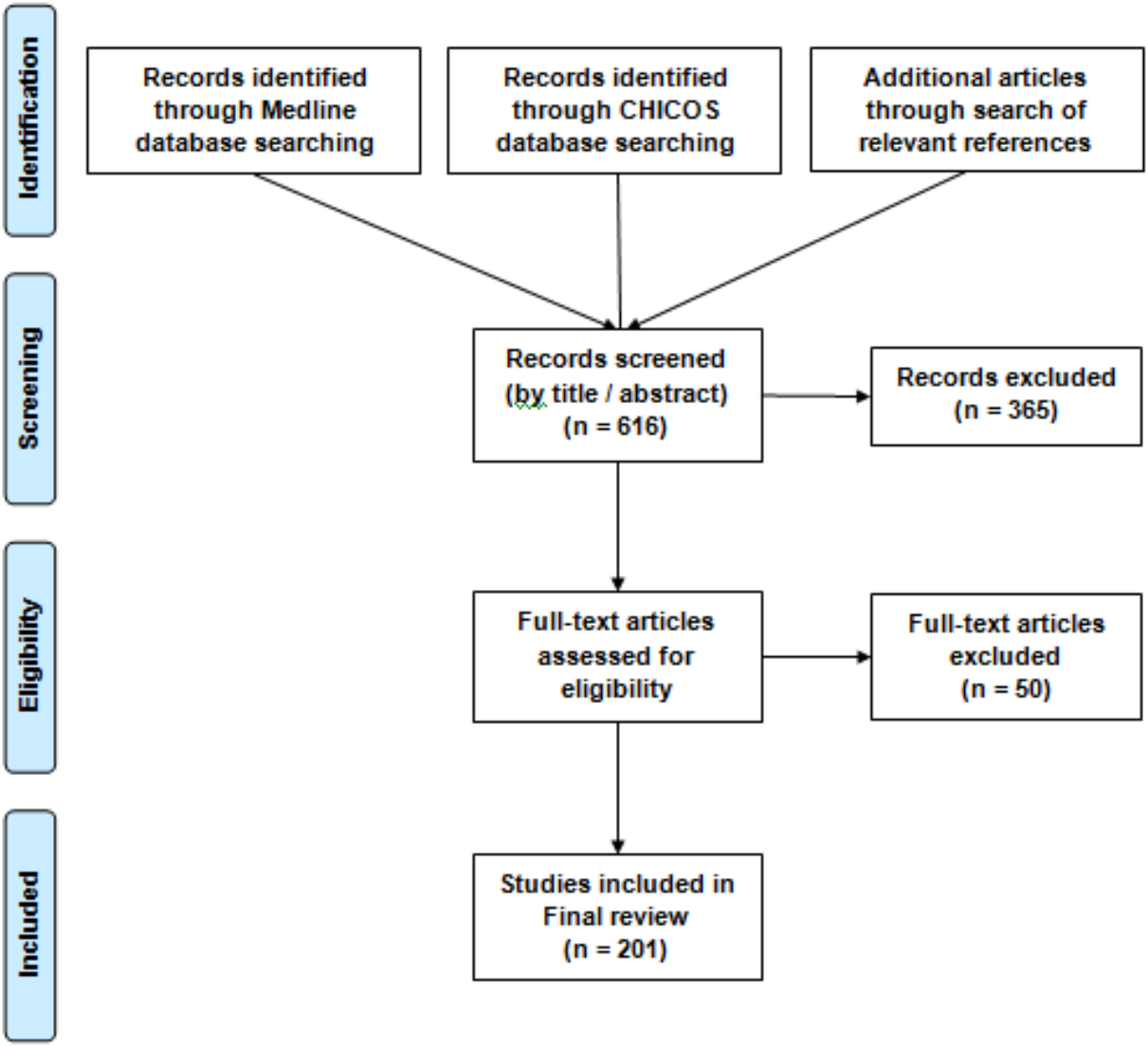

Table 1. Geographical classification of identified studies

Country	Studies identified	Evaluations performed[a]	Neighborhood level[a]		Household level[a]	
			Health	Development	Health	Development
Austria	2	3/4	0/1	—	3/3	—
Belarus	1	2/2	—	—	2/2	—
Belgium	3	2/3	—	—	2/3	—
Czech Republic	1	1/1	—	—	1/1	—
Cyprus	3	3/4	2/2	—	1/2	—
Denmark	19	21/32	0/1	—	20/30	1/1
Estonia	2	2/3	0/1	—	1/1	1/1
Finland	8	10/11	—	—	10/11	—
France	10	9/16	1/1	1/1	4/6	3/8
Germany	16	19/25	0/1	—	17/22	2/2
Greece	8	11/15	3/4	—	6/8	2/3
Hungary	3	4/4	—	—	4/4	—
Ireland	3	3/4	—	—	3/4	—
Italy	5	8/8	2/2	—	6/6	—
Kazakhstan	1	3/5	0/2	—	3/3	—
Kyrgyzstan	1	3/5	0/2	—	3/3	—
Latvia	1	1/2	1/1	—	1/1	—
Netherlands	24	22/34	4/5	—	16/27	2/2
Norway	15	16/20	—	—	13/17	3/3
Poland	2	2/2	—	—	2/2	—
Portugal	1	0/2	—	—	0/2	—
Romania	2	3/3	—	—	3/3	—
Russia	4	5/6	—	—	5/6	—
Serbia	1	1/1	—	—	—	1/1
Slovenia	2	2/2	—	—	2/2	—
Spain	5	5/7	1/1	—	4/6	—
Sweden	24	19/36	4/6	—	15/29	0/1
Switzerland	1	0/2	—	—	0/2	—
Turkey	6	3/10	—	—	3/10	—
United Kingdom	73	107/144	25/28	4/6	52/84	26/26
Ukraine	4	2/11	0/1	—	2/10	—
Uzbekistan	1	3/4	0/1	—	3/3	—

Source: Pillas et al. Paediatric Research (2014)

The conclusions of this study are that multiple adverse social factors, operating at both the household and neighbourhood level, are independently associated with a range of adverse health and developmental outcomes throughout early childhood. The social gradient in health and developmental outcomes observed throughout the remaining life course may be partly explained by gradients initiated in early childhood, suggesting that prevention and early intervention are effective strategies to tackle the complex embedding, clustering and cumulative nature of social disadvantage in early life. The full report is presented in Appendix 1 and a shorter version has been published in *Paediatric Research*.

Achievement 2.1

Published review: Social inequalities in early childhood health and development: a European-wide systematic review

Pillas D, Marmot M, Naicker K, Goldblatt P, Morrison J, Pikhart H.
Paediatric Research, 2014; 76(5):418-424; doi:10.1038/pr.2014.122

3.2 Report on new analysis and methodological developments regarding social inequalities in early childhood (Milestone 2.4) (based on paper published by Morrison et al. in Biomed Central Public Health, 2014)

Young children's health and development is shaped by many different factors residing within the family, school and community which are, in turn, conditioned by the national and global context [10]. The domains of child development [11] require supporting and nurturing living environments to build children's capabilities to their full potential [12]. Even in high-income countries, infant mortality is worst among disadvantaged groups and furthermore, an alarmingly high number of children do not achieve full development [13]. As there is limited evidence of the effectiveness of early childhood health and development interventions from academic scientific reviews, the objective of this study was to identify the relevant existing evidence on interventions carried out during early childhood in European Union (EU) countries during 1990-2013 which aimed to reduce inequalities in health and development and their social determinants.

To achieve this objective, we carried out a systematic review following the PICOCS (Population, Interventions, Comparisons, Outcomes, Context, Study Design) guidelines to examine the literature on early childhood interventions. The review applied the CRD (Centre for Reviews and Dissemination) guidance for undertaking reviews in health care [14,15]. The search was carried out in the PubMed journal database with a predefined syntax [16]. Selection criteria were intervention studies from any setting in any EU country delivered during the years 1999 to 2013 that had been evaluated and showed outcomes in inequalities in child health and developmental domains and their social determinants.

As a result, a total of 23 interventions were selected. All but one of these interventions – delivered in Sweden – were carried out in the United Kingdom and the Republic of Ireland. All these intervantions

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10. UNICEF. The state of the world's children 2007. New York, 2007.

11. Pordes Bowers A, Strelitz J, Allen J, Donkin A. An equal start: improving outcomes in children's centres. The evidence review. UCL Institute of Health Equity, 2012.

12. Commission on Social Determinants of Health, WHO. Closing the gap in a Generation. Health equity through action on the social determinants of health. Commission on Social Determinants of Health FINAL REPORT. Available at: http://whqlibdoc.who.int/hq/2008/WHO_IER_CSDH_08.1_eng.pdf. Accessed 8/2/2013.

13. UCL Institute of Health Equity. WHO. Review of social determinants and the health divide in the WHO European Region. 2013.

14. Centre for Reviews and Dissemination, University of York. Systematic Reviews. CRD's guidance for undertaking reviews in health care. January 2009.

15. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gøtzsche, Ioannidis JPA, Clarke M, Devereaux PJ, Kleijnen J, Moher D. The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration. PLoS Med 2009;6(7).

16. Armstrong R, Waters E, Doyle J (editors). Chapter 21: Reviews in health promotion and public health. In Higgins JPT, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1.0 (updated March 2011). The Cochrane Collaboration, 2011. Available from http://www.cochrane-handbook.org. Accessed 4/3/2013.

aimed to improve parenting abilities, but some had additional components such as: day-care provision, improving housing conditions, and speech or psychological therapies. Programmes offering intensive support, information and home visits using a psycho-educational approach and aimed at developing parent's and children's skills showed more favourable outcomes. Two studies were universally proportionate interventions, and all others were aimed at children and families living in deprived areas.

To conclude, interventions were heterogeneous in their study population and sample size targets, outcome measures and, furthermore, there was a large divergence in the quality of their study design. The majority of the interventions focused on mothers and their children during the first years of their lives. Interventions with better outcomes and a higher level of evidence combined workshops and educational programmes for both parents and children beginning in early pregnancy and included home visits by specialised staff. More literature reviews focusing on the grey literature are needed to develop a larger evidence base on early childhood interventions. Further evaluation of early years interventions should be carried out especially in countries outside the UK within the European context. This review provides a summary of the evidence on effective interventions in Europe to address inequalities in early childhood development and health outcomes. It highlights the limitations of this evidence base, both in terms of the range of interventions for which evaluations are available in the literature and the geographic distribution of these evaluations.

Achievement 2.2

Published review: Systematic review on interventions carried out during early childhood in European countries (1990-2013) which reduce inequalities in health and development and their social determinants

Morrison J, Pikhart H, Ruiz M, Goldblatt P.
BMC Public Health, 2014, 14:1040

3.3 European comparative cohort analysis of social inequalities in child health and development (Milestone 2.5)

To further explore the findings that have emerged from the systematic literature review (Milestone 2.2), UCL has designed a longitudinal analysis programme that relies on rich data from birth cohort studies throughout Europe. The analysis programme has two aims:

1. To estimate the magnitude of social inequalities in early childhood health and development in all European regions;
2. To explain social inequalities in early childhood health and development and explore pathways using multiple indicators of socio-economic position from birth to early childhood in selected cohorts with a range of available indicators.

These aims were achieved in two phases, using data obtained from a range of European birth cohort studies identified during the systematic review of literature described in section 3.1. In Phase I, data from 13 European birth cohorts were used to evaluate the association between social disadvantage and a wide range of health and developmental outcomes. This ensured that the evidence provided a good geographic representation of the European region in order to address the limited evidence from studies outside a small group of European countries (principally in Scandinavia and the British Isles).

As significant and non-significant findings were reported, this provided an up-to-date representation of social inequalities in early childhood health and development throughout Europe.

In Phase II, a more in-depth analysis was performed to test specific interactions and pathways using data about multiple social factors operating at different societal levels (household and small areas such as neighbourhoods). Multilevel modelling and/or structural equation modelling (path analysis) were performed to identify the key social factors and the pathways through which they operate. In this phase, the impact of multiple social disadvantages was also evaluated.

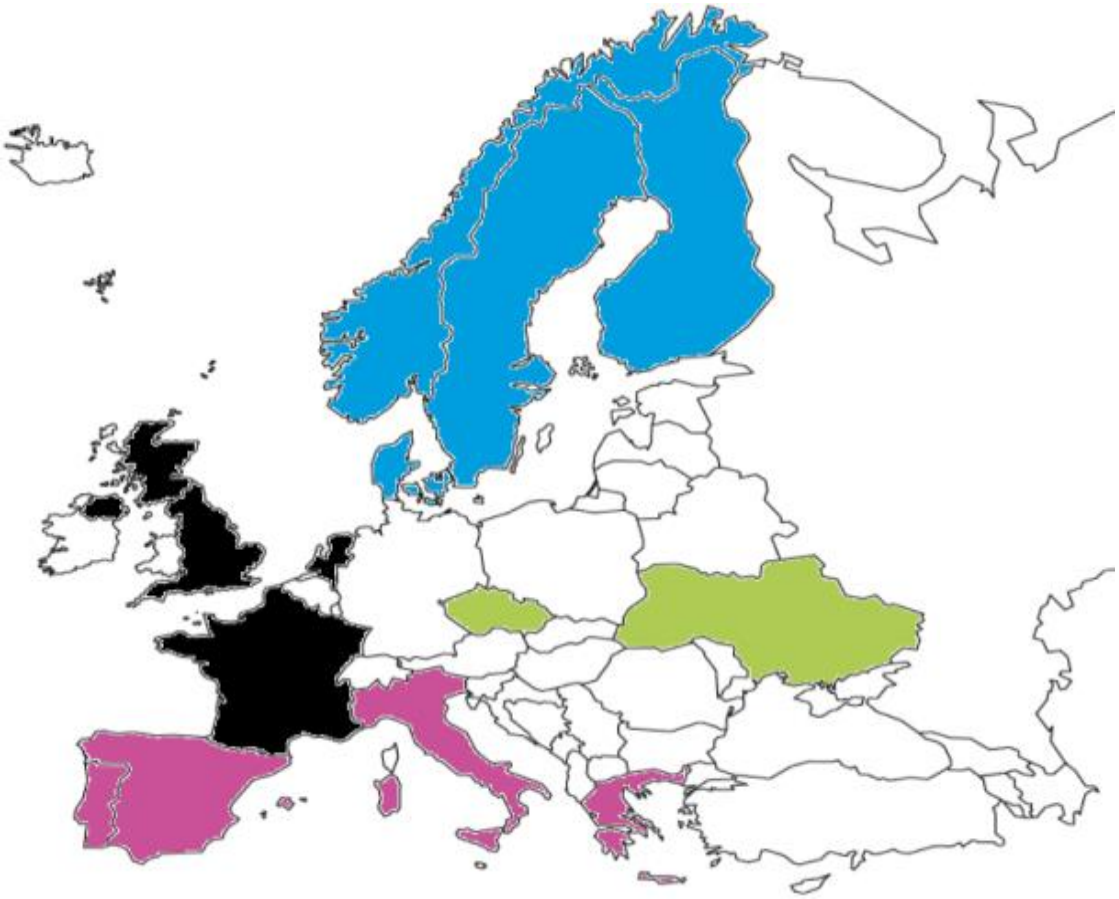
Phase I

In order to address the first aim of Milestone 2.5, social gradients in childhood health and development according to parental socio-economic position were estimated in 13 European birth cohorts that contain data appropriate for this purpose (Table 1). These cohorts covered countries that represented all regions of Europe (Figure 3). On the basis of available evidence and a meta-analysis of variables collected across the cohorts, the mother's level of education at the time of the child's birth was used as the primary socio-economic indicator.

Table 2. Participating European Birth Cohorts, DRIVERS-ECD

Region / Country		Cohort Name	Start Year	Sample Size
South	Portugal	Generation XXI (G21)	2005/06	8600
	Spain	Environment and Childhood Project (INMA)	1997/99	2900
	Italy	Genetics and the Environment: Prospective Study of Infants in Italy (GASPII)	2003/04	650
	Greece	Greek National Perinatal Survey (GNPS)	1983	2300
North	Denmark	Danish National Birth Cohort (DNBC)	1996	96900
	Norway	Norwegian Human Milk Study (HUMIS)	2002	3500
	Sweden	All Babies in Southeast Sweden (ABIS)	1997/99	16000
	Finland	Northern Finland Birth Cohort (NFBC8586)	1985/86	9300
West	UK	Millennium Cohort Study (MCS)	2000/01	18000
	Netherlands	Amsterdam Born Children and their Development (ABCD)	2003/04	8000
	France	The EDEN Mother-Child Cohort	2003/06	1900
Central / East	Czech Republic	European Longitudinal Study of Pregnancy and Childhood in the Czech Republic (CELSPAC)	1991/92	7600
	Ukraine	Family and Children of Ukraine (FCOU)	1992/96	4500

Figure 3. European countries included in cross-cohort analysis



Children's outcomes were selected in order to represent health, development and health behaviours across four periods in early childhood [1]:

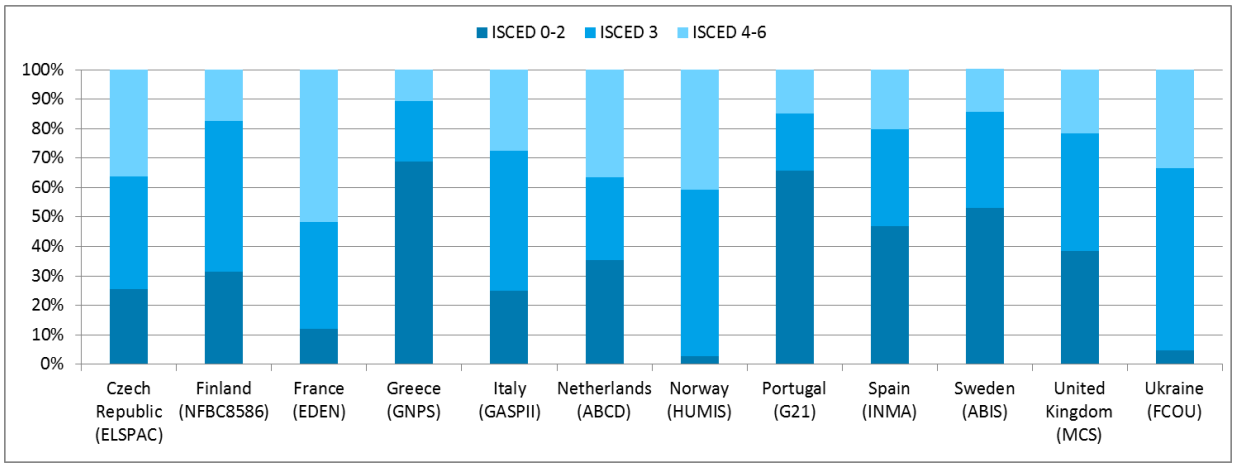
- Pre- and peri-natal: Conception – 1 week
- Infancy: 1 week – 1.5 year
- Toddlerhood: 1.5 year – 3 years
- Pre-school: 3 years – 6/7 years

A careful assessment of the longitudinal data in these birth cohorts was independently conducted by two researchers from the UCL team, and harmonisation of the study data was done in collaboration with local researchers.

As social gradients in early childhood health and development were estimated according to the mother's level of education at the time of the child's birth, harmonisation of the data according to a conceptually hierarchical social structure was necessary. Given the heterogeneity in how maternal education was defined across cohorts (attainment, qualifications, years of schooling), educational data were matched to country-specific coding from the UNESCO International Standard Classification

of Education, 1997 [17,18]. Figure 4 shows the age-standardised distribution of maternal education among the European birth cohorts, according to three categories: pre-primary to lower secondary or second stage of basic education (ISCED Levels 0-2), upper secondary education (ISCED Level 3), and post-secondary non-tertiary to second stage of tertiary education (ISCED Levels 4-6). The likelihood of adverse outcomes in health, development and health behaviours across early childhood was estimated by grouping children according to this categorisation of the level of education attained by their mother prior to their birth.

Figure 4. Maternal education in 12 European birth cohorts according to ISCED-97, DRIVERS-ECD



Source: Ruiz M, Marmot M, Goldblatt P, Morrison J and Pikhart H. (2013).

Data on health, development and health behaviour outcomes across the birth cohorts were harmonised and those available in the majority of cohorts were chosen for this cross-European analysis. An illustration of the study's birth outcome indicators is shown in Figure 5. Work in harmonisation of pre-term birth and small for gestational age during the pre- and perinatal period, and overweight during the preschool period relied on international definitions and cut-off points [19,20,21].

17. United Nations Educational, Scientific and Cultural Organisation (UNESCO). International Standard Classification of Education – ISCED 1997. Available at: www.uis.unesco.org/Library/Documents/isced97-en.pdf. Accessed 15/11/2013.

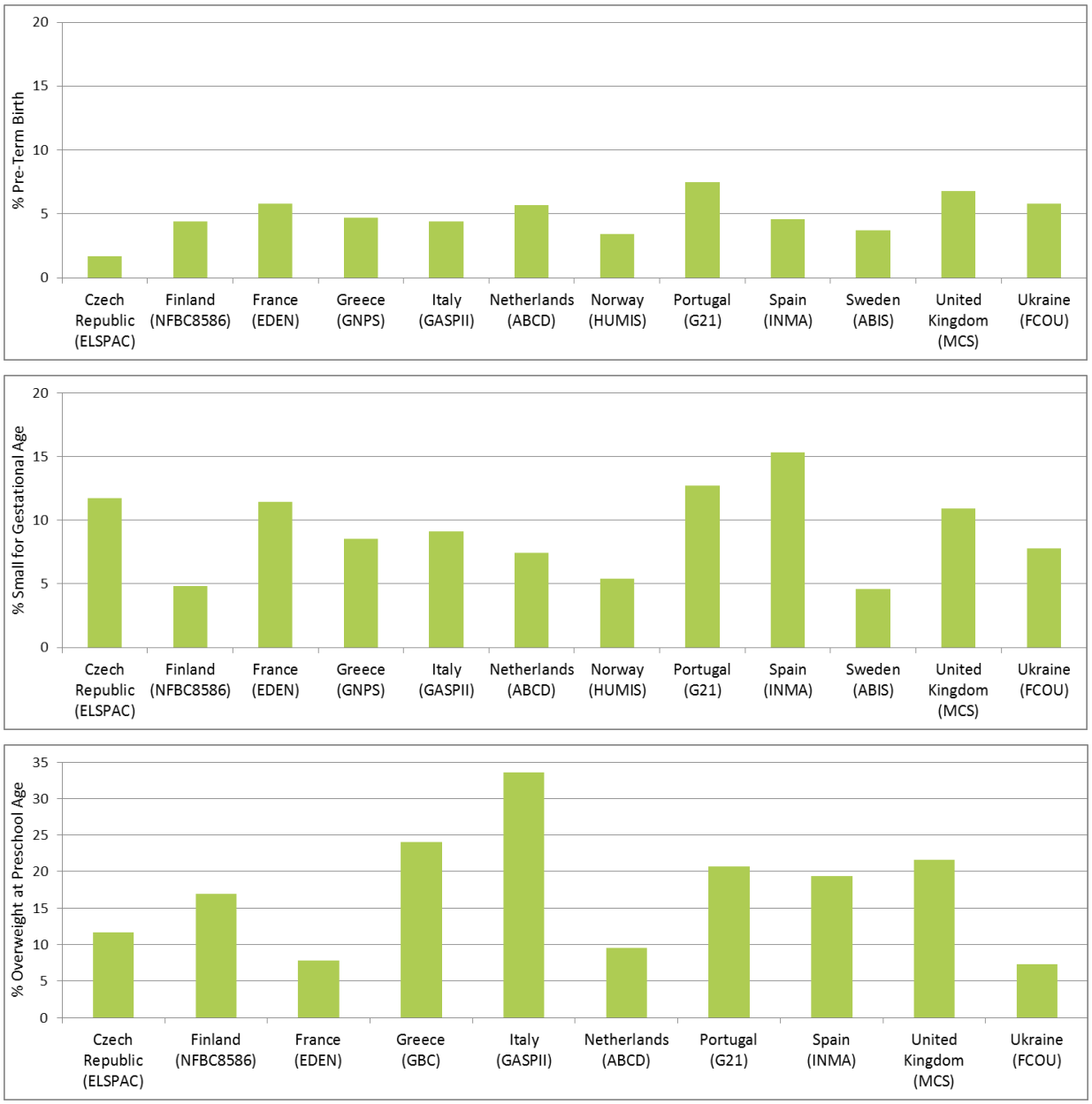
18. United Nations Educational, Scientific and Cultural Organisation (UNESCO). Classifying Educational Programmes – Manual for ISCED-97 Implementation in OECD Countries. Available at: www.oecd.org/edu/1841854.pdf. Accessed 15/11/2013.

19. World Health Organisation (WHO). Fact Sheet: Preterm birth. Updated November 2013. Available at: http://www.who.int/mediacentre/factsheets/fs363/en/. Accessed 01/12/2013.

20. Alexander GR, Himes JH, Kaufman RB, Mor J, Kogan M. A United States national reference for fetal growth. *Obstet Gynecol*. 1996 Feb;87(2):163-8.

21. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ.* 2000 May 6;320(7244):1240-3.

Figure 5. Birth outcome indicators in 12 European birth cohorts, DRIVERS-ECD

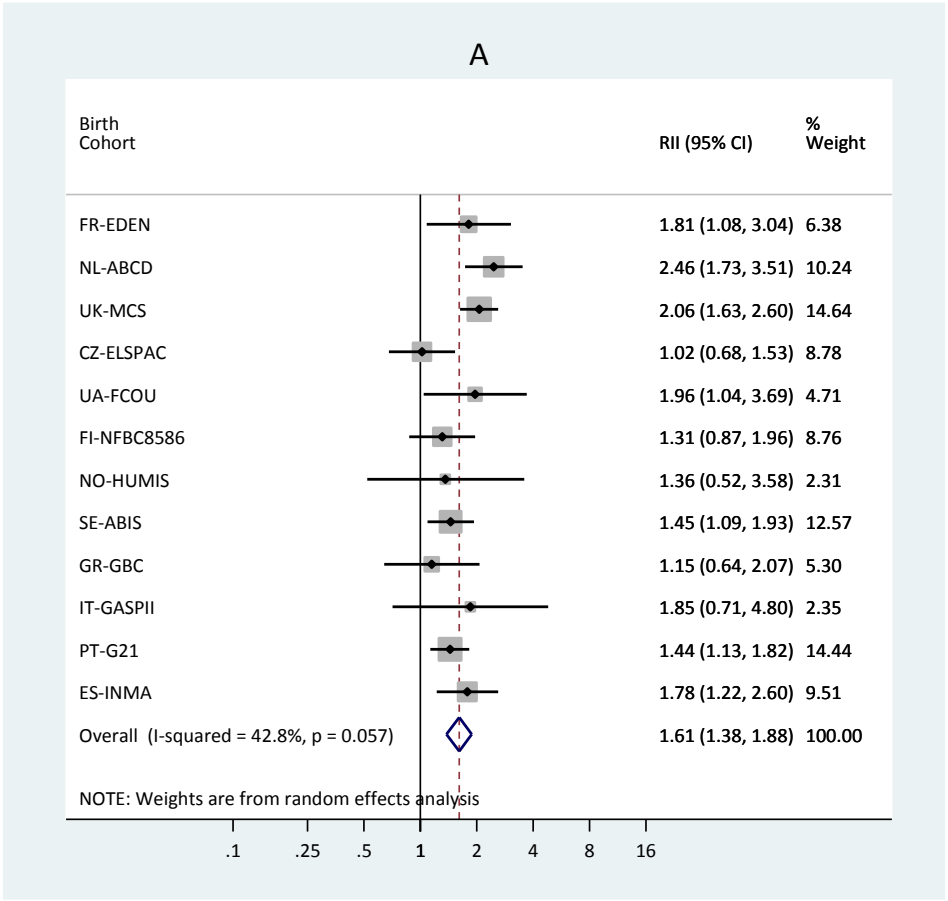


Source: Ruiz M, Marmot M, Goldblatt P, Morrison J and Pikhart H. (2014).

Statistical analyses focused on estimating social gradients in early childhood health and development. Crude and fully-adjusted models were estimated for each cohort. Finally, a pooled estimate was presented for each outcome.

Two examples of results are shown in Figures 6 and 7 while the details of paper describing whole set of results are presented in Appendix 3.

Figure 6. Risk of small for gestational age birth by maternal education (RII/SII)



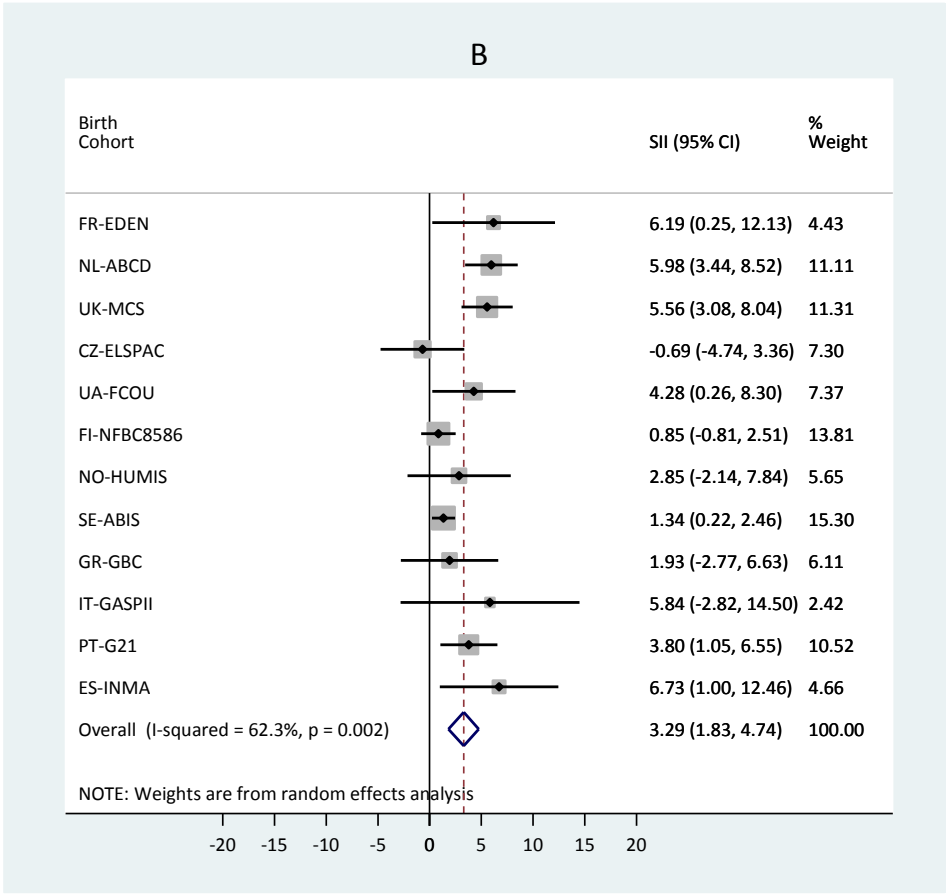
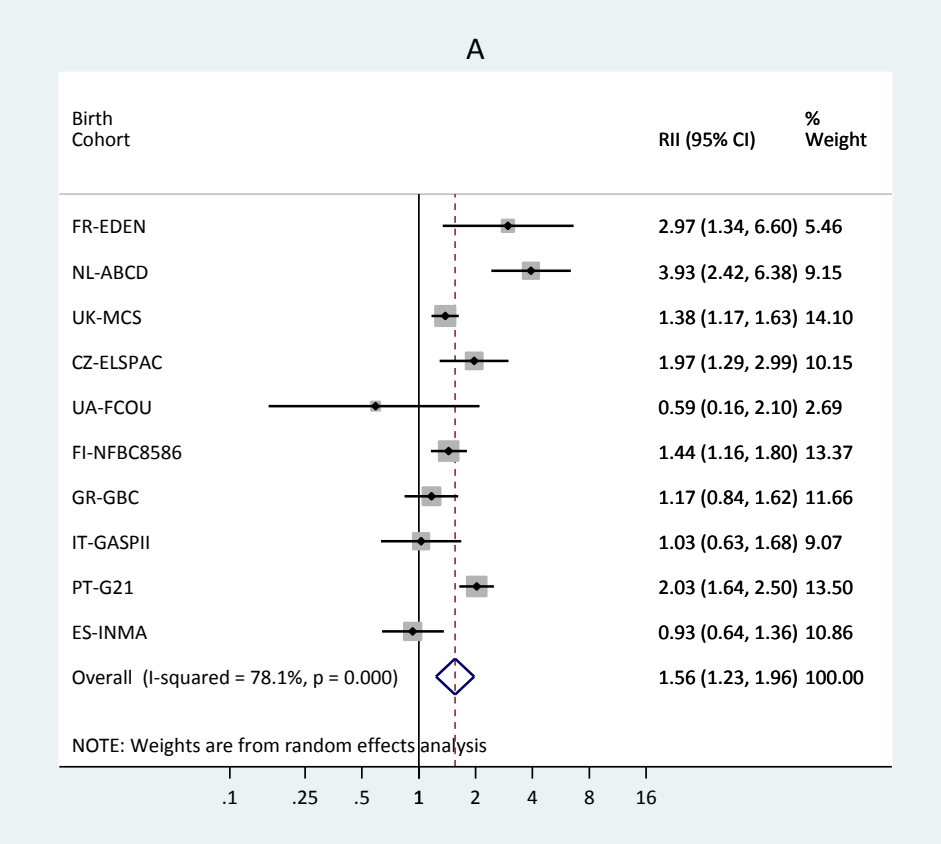
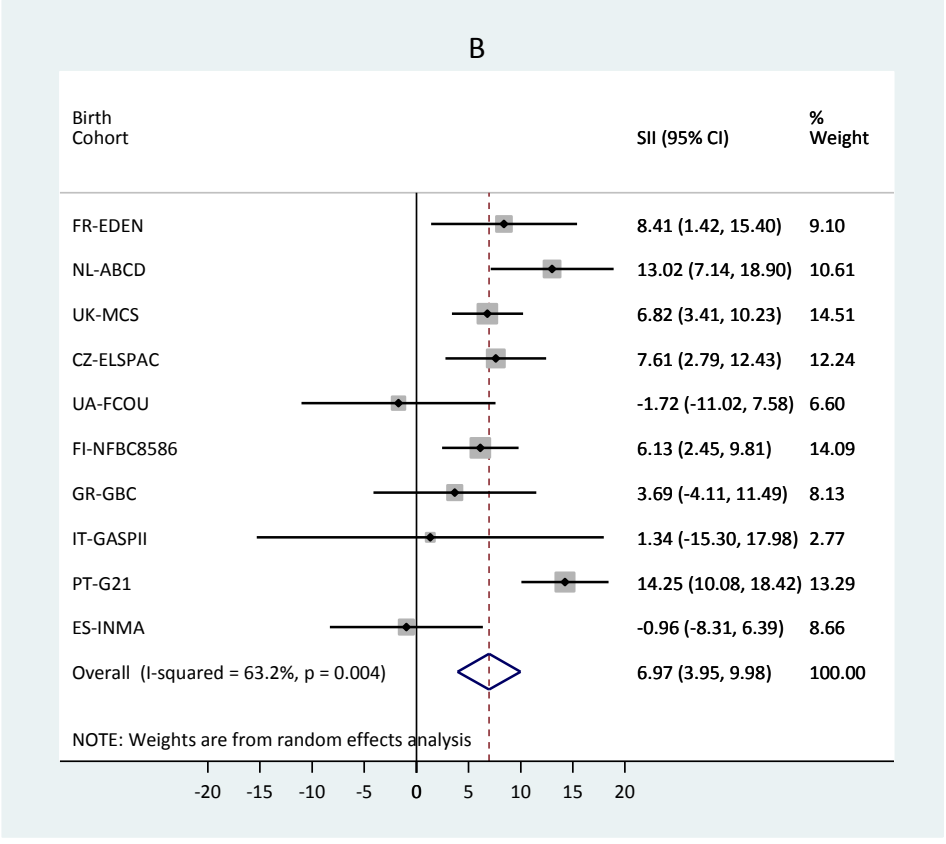


Figure 7. Risk of childhood overweight at age 4-8 by maternal education (RII/SII)





The meta-analysis results of this part of Work Package 2 suggest that adverse early childhood health exists to a larger extent amongst children born to mothers with low education (as compared to the children born to mothers with higher education) in this combined study of European birth cohorts in European countries representing all of Europe. Although some differences between countries do exist, the overall effects are statistically significant and suggest a strong social gradient in selected health and developmental outcomes across Europe. These between-country differences in early childhood health put forward further evidence that the social determinants on preterm birth, small for gestational age births, prevalent asthma and overweight status at the country level play an important role, and that policies and programmes are needed to improve child health across European populations and to reduce inequalities in early childhood health. Early childhood is an important period to mitigate health inequalities and enhance children's immediate and long-term health and wellbeing. Full results of this European comparative analysis are presented in Appendix 3 and have been submitted to peer-reviewed journal (manuscript currently under review).

Achievement 2.3

Analytical paper: Mother's education and the risk of preterm and small for gestational age birth: A DRIVERS meta-analysis of 12 European cohorts

Ruiz M, Morrison J, Goldblatt P, Pikhart H on behalf of co-authors representing all participating cohorts. Journal of Epidemiology and Community Health, 2015 (in press)

Phase II

While Phase I allowed relatively extensive analysis of European data, it did not allow detailed analysis focusing on a range of different early childhood determinants because some of the cohorts did not collect other social characteristics apart from education, and some other characteristics were measured in the way that did not allow comparative analysis.

In-depth analysis planned for Phase II started in parallel with Phase I using the UK-based Millennium Cohort Study. Multilevel modelling was used to examine the association between individual socioeconomic characteristics and living in deprived areas, measured by the Index of Multiple Deprivation (IMD) and the onset of childhood asthma, adjusted for potential confounders. Household income and IMD were found to be important determinants of childhood asthma, even after adjustment of other previously established individual risk factors (see Figures 8 and 9). These findings bring important evidence which shows that living in low income households and in deprived areas increases the risk of childhood asthma. It also suggests the interventions focusing on the reduction of asthma prevalence among children might focus not only on individual risk factors but also on reducing social inequity both at the household and small area level. The results of this analysis are reported in full in Appendix 4.

Figure 8. Odds ratios of childhood asthma by income quintiles

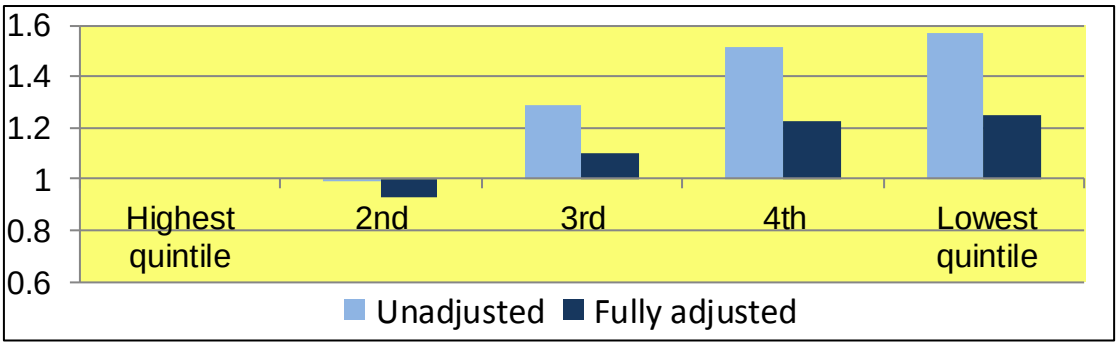
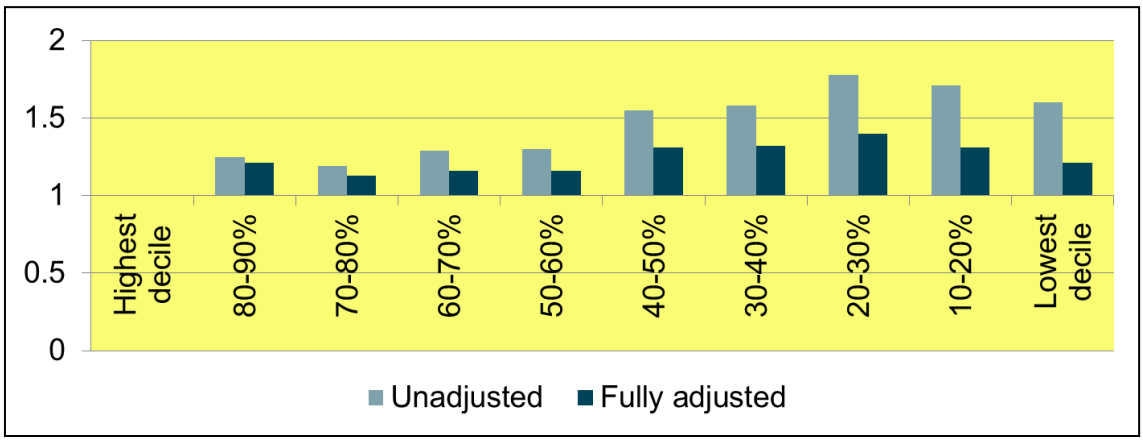


Figure 9. Odds ratios of childhood asthma by deciles of the Index of Multiple Deprivation



In further analysis we assessed the role of socioeconomic factors and maternal psychological distress on mental health difficulties in children aged 5 and 7 years. Maternal psychological distress (MPD) and socioeconomic disadvantage during the early years (expressed by maternal education, maternal social class and housing conditions) were found to impact children's mental health and wellbeing. This study suggests the need for further investigation of factors related to MPD and maternal SEP during early childhood, which may inform policy interventions for mothers and families needed to improve mental health outcomes in children. A full report of this analysis is presented in Appendix 5.

Achievements 2.4 and 2.5

Multilevel determinants of asthma in children.
Nguyen N, Pikhart H, Morrison J. MSc thesis and paper under review.

Maternal Psychological Distress and Total Mental Health Difficulties among Children aged 5 and 7.
Karamanos A, Pikhart H, Ruiz M. MSc thesis and paper under review.

4. Recommendations

Recommendations listed in this Work Package report are based on work done within this Work Package as well as on discussions we have had with other partners and third parties within the DRIVERS project, and on recommendations 19a) and 1(b) of the WHO European review [13]. The recommendations are:

(i) Early years policies and interventions are required in all member states to tackle the adverse health and developmental outcomes that result from a multiplicity of social factors that operate during early years.

(ii) These actions should address the transmission of inequality between generations by:
   a. ensuring that accessible, affordable and high-quality services are available to women and girls – in particular providing health and social care in pregnancy and childbirth and knowledge for effective parenting of young children;
   b. early identification of at-risk families and referral to appropriate services;
   c. ensuring the provision of adequate social protection for parents of young children and addressing the conditions of daily life which make positive parenting difficult (linking WP2 and WP4 – see more details in WP4).

(iii) Policies and services should empower women with children to take control over their lives through an explicit, multi-dimensional and integrated strategy, support their children's health and development – beginning during early pregnancy, and promote a greater parenting role for men. This includes family friendly employment policies (see WP3 for more details) to help parents combine work with their parental responsibilities.

(iv) Ensure that policies to increase the universality of access to a high-quality, affordable, early years and child care are promoted. Such policies need to focus on:
   a. adapting interventions that have proved effective in other countries and contexts to be more appropriate to local conditions, through systematic development and evaluation;
   b. making special efforts to include those children most at risk of vulnerability and exclusionary processes;
   c. ensuring levels of care are related to social needs within a framework of universal delivery, so as to reduce social inequalities in health and ECD (see more in WP4 report);
   d. providing child care which is flexible to families' needs thus allowing women to return to paid employment (see more in WP3 report).

(v) Greater investment is needed in sustaining long-term, harmonised birth cohort studies so as to better understand the variation – across the countries and regions of the European Union – in the lifelong effects of early childhood conditions on health and developmental outcomes. This investment would be analogous to the current investment in labour force surveys and surveys of income and lifestyles.

(vi) Further evaluation of early years interventions should be carried out especially in countries outside the UK, within the European context. These should include results showing whether interventions had differential impact for disadvantaged groups.

(vii) Review the role of randomised controlled trials and alternative study designs (e.g. population-based cohort studies, multi-level analyses) in evaluating ECD interventions

DRIVERS (2012-2015) is a research project funded by the EU's 7th Framework Programme. It aims to deepen understanding of the relationships between some of the key influences on health over the course of a person's life - early childhood, employment, and income and social protection - and to find solutions to improve health and reduce health inequalities.

The research is undertaken by a consortium including leading research centres and organisations representing the public health sector, civil society and businesses.

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