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Plenary Presentations
It has become clear that war regularly presents extremely adverse circumstances not only for combatants, but also for civilians. In fact, estimates from various wars over the past seventy years suggest that non-combatants comprise two-thirds to ninety percent of casualties. Additionally, for those who survive, there are likely to be long-term effects on health and biology. Some of these, such as physical injury and psychological trauma, are well-known. Yet other effects may be more subtle and may be elucidated by a developmental biological perspective. In early life when growth rates are highest, these conditions may have their greatest impact. Depending on local circumstances, a developing embryo, infant, or child growing in a place embroiled in armed conflict is likely to face – directly or indirectly – various stressors, including malnutrition, infectious disease, and/or psychological stress. Because of this, the conditions of war and forced displacement may become embodied, getting ‘under the skin’ for fundamental biological reasons. For example, nutritional constraints may lead to shifts in growth trajectories, while epigenetic responses may affect gene expression. It has been hypothesized that such outcomes may be adaptive in the short-term, favouring immediate survival, but may be enduring or even permanent, eventually lead to pathology and shortened life spans. There is also evidence that the subsequent generation may be affected by traumatic experiences encountered by their parents.

This paper will address some of the ways that war and forced displacement experiences can become embodied in children from several populations, surveying recent high-intensity conflicts from various regions.

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PL.02 - The stunted child with and overweight mother as an growing public health concern in resource poor environments: Guatemala as a case study

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In many countries, it is well recognized that child undernutrition and adult overweight and obesity are both conditions of poverty. Even in countries such as Guatemala, where the prevalence of chronic undernutrition is the highest in all of Latin America, maternal overweight and obesity is high and rising. While child undernutrition has been long recognized as a risk factor for later chronic disease, these risks are even greater where stunted children are growing up in an obesogenic environment.

The aim of this study is identify the socio-demographic risk factors of stunted 5 to 23 month old Guatemalan children living in an obesogenic environment, as evidenced by maternal overweight and obesity. Anthropometric measures (weight and length), were collected in 446 mother-infant dyads, with subsequent classification of infants for stunting (25 kg/m²) or obesity (BMI≥30 kg/m²).

Two-thirds of the 446 mother and child pairs exhibited either child stunting alone (21.5%), maternal overweight or obesity alone (28.3%), or both conditions together (16.8%). In this population, stunted and non-stunted children were equally exposed to the obesogenic environment as measured by maternal BMI (maternal BMI≥25). Stunted children living with an overweight or obese mother were statistically indistinguishable from other stunted children.

These results confirm the expected high prevalence of a dual burden of child stunting together with maternal overweight. In context where child stunting and maternal overweight/obesity are both high, clinicians and policy makers should prioritize the chronic disease concerns for stunted children.

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PL.03 - Poverty, disability and self-reported health amongst residents and migrants in Gauteng, South Africa

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Background: Rapid urbanisation and migration (both internal and transnational) pose twin challenges to health in low- and middle-income countries, where the growing population of urban areas can outstrip the availability of formal housing and overstretch the provision of basic services (such as water, sewage, refuse collection and electricity).

Aim: The aim of the present study was to explore the relationship between individual - and household-level indicators of poverty and self-reported health in a rapidly urbanising middle-income country, to assess the relative importance of these characteristics to the health of residents and recent migrants.

Methods: Descriptive univariate and analytical multivariable statistical analyses were undertaken on data collected by the third Quality of Life household survey completed by the Gauteng City Regional Observatory in 2014. This survey generated a representative sample of n=27,490 respondents from throughout Gauteng Province (South Africa’s most urbanised province), for whom complete data were available for n=24,933 respondents on a range of individual- and household-level sociodemographic and economic variables, as well as self-reported disability and health-limited work and social activities. Sociodemographic and economic predictors of self-reported disability and health were assessed using multivariable logistic regression after adjustment for potential confounders identified using a directed acyclic graph.

Results: These analyses indicate that individual- and household-markers of poverty have different relationships with self-reported disability and health-limited work and social activities. At the individual-level, age, population group classification, migrant status, educational attainment and employment status had similar, inverse relationships with all three markers of self-reported health, the odds for disability or health-limited work and social activities being lower amongst: older respondents, those classified as ‘White’ or ‘Asian/Indian’ (as compared to those classified as
‘African’ or ‘Coloured’), and amongst both transnational (for disability and health limited work and social activities) and internal (for disability alone) migrants. Across all respondents the odds for disability and health-limited work and social activities decrease with increasing educational attainment and with secure, full-time employment. However, at the household-level, only adult food poverty (as assessed by one or more adults having skipped a meal in the past year because there had not been enough money to buy food) was consistently associated with an increased odds of disability and self-reported health-limited work or social activities. Instead, respondents in crowded households had a significantly lower odds of disability but a significantly higher odds of health-limited work and social activities; and while respondents in households that had fewer basic services and assets (particularly: refuse collection, flush toilet, telecommunications and car) had a significantly higher odds of disability, the absence of some basic services and household assets (particularly: mains electricity, telecommunications and television) were significantly associated with a lower odds of health-limited work or social activities, irrespective of migration status.

**Conclusions:** The substantive variation in sociodemographic and economic predictors of self-reported health at the individual- and household-level may partly explain the lower odds of disability and health-limited work and social activities of migrants, given that migrants: were less likely to be disabled, and tended to be younger, with higher educational attainment and better employment status than residents; yet were also more likely to be living in informal and crowded households that had less access to basic household services and fewer household assets. Nonetheless, these findings also suggest that any individual-level health benefits of migration associated with the selective migration of younger, able-bodied, better educated and more employable/entrepreneurial individuals are unlikely to be sustained over time for those migrants who remain in under-served and impoverished households as they settle and grow older.

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PL.04 - Do socio-economic inequalities in infant growth in rural India operate through maternal size and birth weight?

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Introduction: 3.1 million young children die every year from undernutrition. Greater understanding of associations between socio-economic status (SES) and the biological factors that shape undernutrition are required to target interventions.

Aim: To establish whether SES inequalities in infant size at 12 months operate through maternal and infant size measures.

Methods: The sample comprised 360 Indian infants born in 60 villages in rural Andhra Pradesh 2005-2007. Structural equation path models were applied to decompose the total relationship between SES (standard of living index (SLI)) and length and weight for age Z-scores (LAZ and WAZ) at 12 months into direct and indirect (maternal BMI and height, birthweight Z-score and LAZ/WAZ at 6 months) paths.

Results: SLI had a direct positive association with LAZ (Standardized coefficient = 0.09, 95% CI = 0.03, 0.15), and WAZ at age 12 months (Standardized coefficient = 0.09, 95%CI = 0.03, 0.15). It also had additional indirect positive associations through increased maternal height and associated indirect paths through WAZ at birth/ six months, accounting for 20% and 47% of the total effect for WAZ and LAZ respectively.

Conclusions: Findings support targeting evidence based growth interventions towards infants from the poorest families with the shortest mothers. Increasing SES can improve growth for two generations.

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PL.05 - Association between maternal leg length and cardiovascular disease risk factors in rural Indian adolescents

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Introduction: Observational studies suggest that maternal undernutrition during pregnancy may increase offspring’s risk of cardiovascular disease, but this hypothesis is not strongly supported by trial data, raising the possibility of confounding by maternal undernutrition before pregnancy. To investigate this, we examined the association between maternal leg length and offspring’s risk of cardiovascular disease, in a cohort of adolescents, roughly half of whom were exposed to nutritional supplementation during pregnancy.

Methods: Data on 1,033 mother-offspring pairs from the first wave of the Andhra Pradesh Children and Parents Study (APCAPS) were analysed. Associations between maternal leg length (as proxy for pre-pregnancy undernutrition) and offspring’s body composition and cardiovascular risk were examined, with and without adjustments for offspring’s leg length and exposure to nutritional supplementation in pregnancy.

Results: The mean height of mothers was 150 cm (leg length 70 cm) and offspring body mass index (median age 16 years) was 17.2 kg/m². Maternal leg length was inversely associated with offspring’s adiposity (a 10% longer maternal leg length was associated with a 1.8 kg/m² lower body mass index), which was attenuated, but remained robust to adjustments for offspring’s leg length and nutritional supplementation. The associations between maternal leg length and other cardiovascular risk factors were not statistically robust, despite showing broadly inverse patterns of associations.

Conclusions: We found weak evidence in support of our hypothesis that the lack of concordance between observational and trial data may arise from persistent effects of maternal undernutrition before pregnancy.

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PL.06 - Poverty and unhealthy behaviours in Portuguese children. Changes from 2002 to 2009

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Aim: Sedentary behaviours play a significant role in childhood obesity. Our aims are to study the shifts in TV viewing, computer use and sports participation between 2002 and 2009 in Portuguese school-aged children (7.0-9.5 y) and to analyse the association between socioeconomic status (SES) and these behaviours.

Methods: Two cross-sectional studies were done, in 2002 (N=4511) and 2009 (N=4521). Parents fill-out a questionnaire concerning family characteristics and children’s behaviours for sports participation and sedentary behaviours such as TV viewing and Computer use. Socioeconomic status (SES) was defined in three levels from low, medium and high. We used Qui-square analysis.

Results: Between 2002 and 2009 the percentage of Portuguese children that surpassed the recommended 2 h/day of TV viewing increased 12% with children from lower SES show highest values (21.4%, 2002; 37%, 2009) than those from high SES (8.7%, 2002; 21.7%, 2009). For Computer use between 2002 and 2009 the percentage of children that use for more than 1 h/day increased 8.2%, with children from low SES show highest values (18.6) than those for high SES (9.8%). Only half of the children participated in after-school sports programs, with children from families with low SES showing the lowest values (36.2%, 2002; 38.3%, 2009) and the highest values observed in children from high SES (80.3%, 2002; 77.3%, 2009).

Conclusions: Sedentary behaviours showed a marked increase from 2002 to 2009. There is a considerable social gradient in sedentary behaviours and physical activity, with children from low SES being more sedentary and having less sport activities.

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PL.07 - Reducing health inequalities among women and girls living in poverty: the success of Bangladesh

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Introduction: Bangladesh has made dramatic improvements in health of girls and women in the last 20 years, most notably with the marked reduction in maternal mortality, and reversal of the excess mortality of girls relative to boys.

Aim: This paper aims to examine the social, economic and educational factors that have led to health improvements among women and girls even among the poorest households, and identify areas where inequalities persist.

Method: The health of women and girls is examined using data from school health surveys of children and adolescents (n=900, aged 6-15 years) in southern Bangladesh (anthropometry, anaemia and sociodemographic variables) and from a large scale livelihoods survey in northeast Bangladesh (sociodemographic data, female school enrolment and age at marriage).

Results: Against a background of a high prevalence of undernutrition (35.7% of children and adolescents were stunted and 42.4% were thin) there were no gender differences in the prevalence of undernutrition or anaemia in the schools surveyed. In northeast Bangladesh, adolescent girls (11-15 years) had higher rates of school attendance than boys, but married teenage girls had significantly lower rates of school enrolment than unmarried girls (20% vs 65% respectively at age 15 years).

Conclusions: These findings accord with the national picture of successful reductions in gender inequalities in health through low cost, community-based health programmes and education policies targeting the poorest sectors. This paper will highlight further research needs such as the effect of early age of marriage and betrothal on the health of women and girls.

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PL.08 - Refugees in Portugal: What do we know?

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PL.09 - Power and pollutant exposure among minorities: one Native American experience

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Aim: To describe the relationships between the biology and health of Native Americans (NA) and the social forces that this group experiences.

Methods: Health statistics available from government sources contextualize a case study of the St. Regis Mohawk (Akwesasne Mohawk Nation) to illustrate the connection of poverty, political power, Mohawk culture and pollutant exposure, to the biology and health of the community.

Results: NA comprise approximately 2% of the US population. NA are a highly diverse group of cultures that have a history of oppression and attempted extermination in common. Compared to the total US population, NA have a death rate that is 1.2 times greater. The percentage of elderly is smaller than in the total US population. The post-neonatal death rate is twice that of whites while the rate of low birth weight is similar. The fertility rate and birth rates have declined precipitously in the past 30 years. The scarcity of elderly is an important loss when a society seeks to preserve its traditions; the low rate of reproduction signals a declining population.

Like many minority communities, the Akwesasne Mohawk Nation has experienced significant pollutant exposure while seeking to preserve and reinvigorate its culture. The pollutant exposure presents challenges to performing activities that express and enliven its culture and may affect physical development, sexual maturation and reproduction creating challenges to the emotional, social and physical survival of the community.

Conclusions: Political power and pollution exposure are related and affect the biology, health and culture of those exposed.

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Introduction: There is a growing evidence of the impact of the current European economic crisis on health. In Spain since 2008 there have been increasing levels of impoverishment and inequality, and important cuts in social services, including per capita spending on healthcare.

Aim: The objective is to evaluate the impact of the economic crisis on underweight at birth in Spain.

Methods: Trends in underweight at birth were examined between 2003 and 2012. Underweight at birth is defined as a singleton, term neonatal weight lesser than -2 SD from the median weight at birth for each sex estimated by the WHO Standard Growth Reference. With this criteria and with data from the Statistical Bulletin of Childbirth, 2 933 485 live births born to Spanish mothers have been analysed. Descriptive analysis, seasonal decomposition analysis and crude and adjusted logistic regression including individual maternal and foetal variables as well as exogenous economic indicators have been performed.

Results and Conclusions: Results demonstrate a significant increase in the prevalence of underweight at birth from 2007. All maternal-foetal categories were affected, including those which showed the lowest prevalence before the crisis. In the full adjusted logistic regression, year-on-year GDP per capita remains predictive on underweight at birth risk, in such a way that the fall in GDP between 2007 and 2012 determined an increase of the OR of underweight at birth by 7.38%. Previous trends in maternal socio-demographic profile and a direct impact of the crisis are discussed to explain the trends described.

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PL.11 - Measuring poverty in skeletal biology: Stature and status in Identified skeletal collections

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Stature is frequently used as an important indicator in the reconstruction of heath conditions and socioeconomic inequalities in living, and past populations (PP) as it is a biological trait extremely influenced by environmental conditions. The current study explores stature, via adult femur lengths measurements, in relation to place and year of birth, and occupation at death of individuals from Portuguese Identified Skeletal Collections (ISC). It aims to highlight the role of regional variability in bone length, exploring its potential as poverty indicator in skeletal biology, and discuss the limitations associated with documentary evidence of occupation used to categorize socioeconomic status in ISC.

The sample used is composed of 603 individuals, with an age at death ranging between 20 and 98 years old. The individuals were born between 1822 and 1935, and died between 1891 and 1965 in the cities of Lisbon and Coimbra. Several social strata are present, based on occupation at death, although women classification was almost exclusive as “domésticas”. Femur length revealed a positive significant trend only for male individuals. Regional significant differences were only found in females. Significant differences were found between occupational categories, although not all associated with lower status occupations. Careful interpretation of the results is necessary as the known data used in the analysis, i.e. place of birth and occupation are seen as fixed, which contrasts with human biology, social and economical changeability and adaptability which are extremely hard to measure in skeletal remains.

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A symbiotic relationship exists between leprosy, tuberculosis (TB) and poverty, both in past and present human populations. These mycobacterial diseases are amongst the few diagnosable infections in human skeletal remains and thus may serve as an indirect evidence of poverty in past societies. This presentation aims to address recent advances in the paleopathological and paleoepidemiological knowledge of leprosy and TB resulting from a new research approach which combines the study of human skeletons from archaeological contexts with the analysis of medical archives belonging to pre-antibiotic patients.

Regarding leprosy, the archival analysis consisted in the study of the bone changes recorded in 300 clinical files from the Hospital-Colony Rovisco Pais, the last leprosarium in Portugal, and the skeletal analysis was carried out on 191 individuals from the St. Jorgens medieval leprosarium cemetery located at Odense, Denmark. Regarding TB, 315 clinical files of pulmonary TB patients from the Carlos Vasconcelos Porto Sanatorium, the first private Portuguese sanatorium, were consulted and a systematic review of TB cases from the Portuguese archaeological record was done.

The correlation between clinical data and skeletal changes observed in archaeological cases raised interesting issues, namely: 1) the improvement of the paleopathological diagnostic criteria for both diseases; 2) unveiled the impact of poverty and poor socioeconomic conditions on disease progression and skeletal involvement; 3) a reinterpretation of the history of these diseases of poverty in the Portuguese territory.

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Oral Presentations
OR.01 - Maternal influences on Cape Verdean children living in Portugal

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Maternal health strongly associates with offspring’s health. In Portugal, the Cape Verdean community is one of the most deprived migrant groups. We hypothesise that these social and economic inequalities will have intergenerational effects. The aims of this presentation are i) to determine the nutritional status of Cape Verdean mother’s and its relationship with child health outcomes; ii) to check for differences between Cape Verdean dyads and Portuguese dyads.

Data was collected from November 2013 to January 2014 in households of the Cova da Moura neighbourhood in Lisbon, Portugal. The sample was composed of 62 mothers and their biological offspring (6-10 years old). Measurements included anthropology, body composition and socioeconomic variables. Stunting and underweight categories proposed by the World Health Organization (WHO) were used for reference.

Cape Verdean mothers have higher obesity rates (25.6%) than the Portuguese (19.8%). Maternal marital status was found to negatively influence child’s body mass index.

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OR.02 - Biology, Behaviors, T2DM and hypertension among young adults in Accra, Ghana

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Introduction: Type 2 diabetes mellitus (T2DM) and hypertension used to be associated to Western countries; however, there has been a surge in both diseases in the Sub-Saharan region in recent years, with urban communities being the most affected. In Ghana, there is a 6.3% (15 – 70 years) prevalence for T2DM (Amoah et al., 2002) and 29.4 % for hypertension (Agyemang, 2006). These figures may even be underestimating the actual prevalence due to limited access to health care facilities by a good number of the population. The problem of T2DM and hypertension is assumed to be directly linked to the effects of globalization and urbanization (Abrahams et al., 2011) and this is manifested through changes in nutrition, reductions in regular physical activity and an overall more sedentary lifestyle (de-Graft Aikins et al., 2010a).

Aim: 1. To investigate aspects of the behavioural transition (from physical activity to physical inactivity patterns) and the nutrition transition (from traditional to globalized foods) in young adults from urban settings in Ghana; 2. To put these aspects in the bio-cultural context of the rising levels of the epidemic of T2DM and hypertension in Ghana.

Methods: The sample constituted of 117 (mean age= 26.07 years ± 4.35; range 19-35 years) young adult participants, (females and 55 males). Information on demographic data, family history, diet, subjective PA measurement, tobacco use and alcohol consumption was collected through the use of questionnaires. Blood pressure (BP), fasting plasma glucose (FPG), oral glucose tolerance test (OGTT) and serum lipids (total cholesterol and triglycerides) were taken using the WHO cut-offs in defining CVD risk factors. Anthropometric indexes such as Body Mass Index were calculated from the anthropometric measurements. Nutritional status was also derived from the anthropometric parameters by assessing and comparing participants’ results against the Comprehensive Growth References published by Frisancho (2008) based on the NHANES III. Objective Physical activity and sedentary behaviour levels were
measured with ActiGraph® GT accelerometer (ActiGraph, Pensacola, FL).

Results: The number of participants who answered positively to smoking was 2 (1.7%), and 43 participants (37.1%) responded affirmatively to alcohol consumption. Both FPG and the OGTT recorded no cases of T2DM in the studied sample. High BP in several of the participants was recorded. For systolic BP, 25.6 % of the participants fell within the category of pre-hypertension and 3.4 % for hypertension. The figures for diastolic BP were 6.8 and 1.7% respectively for pre-hypertension and hypertension. Blood tests showed that 21.7% of the participants had high blood cholesterol and 20.9% elevated triglyceride. The number of stunting recorded in the sample was 2.3% (3 men), and only one person fell under category of underweight. Conversely, 37.6% of the sample was either overweight or obese.

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OR.03 - Diet and mortality: Famine, feast and fertility

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Aim: To test the hypothesis that new data from stable isotope analysis of human deciduous dentine collagen shows potential to investigate the diet and physiology of the mother during pregnancy.

Methods: The stable isotope ratios of carbon and nitrogen in human tissues have been shown to reflect both the diet and changes due to the level of undernutrition of an individual. It has been established, using micro-CT scans of known-age deciduous teeth, that the first 1/2mm of dentine in deciduous teeth forms before birth. Novel techniques allowing the analysis of tiny samples of dentine collagen for samples taken from both archaeological populations with known stress are compared to a small number of modern cases with known medical histories to investigate the hypothesis.

Results: The high variability of values from dentine formed in utero suggests that these may be recording stress levels in mothers during pregnancy.

Conclusions: The analysis of exfoliated deciduous teeth may give a guide to in utero experience and hence the lifetime effects and need for health interventions. These can be applied to modern children, but also applied to archaeological populations to estimate the health of mothers in the past.

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Aim: To investigate the prevalence of under-nutrition in adolescent (12-17 year-old) girls from low and middle-income countries, and its association with national wealth, food security, income and gender inequality indices.

Methods: Cross-sectional study using data from the Global School Health Survey (GSHS). Body mass index (BMI) was calculated from self-reported height and weight; moderate and severe under-nutrition were assessed using the World Health Organisation BMI z-score cut-offs. Frequency of going to bed hungry (GSHS questionnaire) was used as a family-level poverty marker. Countries providing <33% missing height/weight data were included. Gross Domestic Product (GDP; n=36 countries), Gini income inequality index (n=30), Gender Inequality Index (n=31), and the Global Food Security Index (GFSI; n=23) were retrieved for the GSHS survey year (where possible) or closest available year. Multilevel logistic regression (adjusted for age, family-level poverty, survey and index year) was used to investigate the association of each index with prevalence of moderate-severe and severe under-nutrition.

Results: Overall (40 countries; 61603 girls) prevalence of moderate and severe under-nutrition was 6.30% (0% in Niue/Tonga to 19% in Sri Lanka) and 1.34% (0% in Niue/Tonga/Cook Islands/Malawi/Guatemala to 6% in Sri Lanka) respectively. Only GDP (Odds ratio (OR)=0.94; 95% confidence interval (CI): 0.88-0.99) and GFSI (OR=0.96; 95%CI: 0.93-0.99) were associated with moderate-severe under-nutrition prevalence. No index was associated with severe under-nutrition, although GDP reached borderline significance (OR=0.94; p=0.07).

Conclusions: Under-nutrition in adolescent girls was common but not present in all countries. National wealth and food security, but not income/gender inequality indices, were associated with under-nutrition prevalence.
OR.05 - The effects of poverty on skeletal maturity and growth in Sudanese children

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Introduction: The effects of poverty in the growth and maturity of East African population is poorly defined with little data.

Aim: To compare the impact of poverty on skeletal maturation and growth

Methods: Affluent children (N=309) from an orthodontic clinic in Khartoum were compared with peripheral state students (N=366) equally distributed across age (6-21 years). Height, weight and a standardised lateral cephalometric radiographs of children of known age were taken. Cervical vertebral maturation method was used to assess skeletal development. The children were divided into 4 developmental groups: pre-pubertal(6.0-8.9 years), pubertal (9.0-11.9 years), adolescent (12.0-15.9 years) and adult (16.0-21.9 years). Mean ages of four cervical stage attainments were calculated using probit analysis. The impact of poverty on growth was assessed by comparing height for age, weight for age and body mass index Z scores between groups. A student t test was used to compare groups.

Results: No statistical differences were detected for the age of cervical vertebral stage attainment between poor and affluent groups in all age categories (p>0.05). Weight for age Z scores were significantly lower in all age groups in poor children (p<0.05). Body mass index Z scores were lower in the pre-pubertal, pubertal, and adolescent groups but not adults (p<0.05). Height for age Z scores were lower in adolescent group only (p<0.05).

Conclusions: In line with other investigators we conclude that skeletal maturity is less affected than growth by poverty in our group.

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OR.06 - Income inequality, poverty and health during the 2008 economic crisis

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Background: The inverse relationship between rising income inequality and average health at the population level is known to be (at least in part) an artefact of the curvilinear relationship between income and health at the individual level. However, because it is possible that the height, slope and curvilinear nature of these individual-level relationships might vary over time and place, the impact of income inequality on health at the population-level may also vary. The aim of the present study was to examine this phenomenon before during and after the economic crisis of 2008 amongst the high-income countries of the OECD, with particular emphasis on the four Eurozone countries (Greece, Portugal, Ireland and Spain) experiencing debt-relief. Methods: Regional-level data were obtained from the OECD for all member countries between 2005-2012, including: measures of average health status (life expectancy and age-standardised mortality rates); average income (GDP at purchasing power parity); and income inequality (Gini coefficient – only available for 2010). Linear curvilinear functions were fitted to level GDP and health variables for each of these years using STATA. Additional analyses of regional Gini values were conducted for data generated in 2010 alone. Results: These analyses demonstrate that the curvilinear nature of the relationship between health status and GDP varies over time and place, with lower, steeper and more curvilinear fitted functions occurring in the wake of the 2008 economic crisis, contributing to an accentuated relationship between income inequality and average health status. The impact of these changes appears to have been exacerbated in countries who addressed the crisis through austerity, and those experiencing international-level debt relief.

Conclusion: Factors influencing the relationship between income and health at an individual level (as assessed from regional data) contribute to the worsening impact of income inequality and health, even in those high-income countries where the individual-level relationship between income and health is shallow. The sensitivity of these relationships to macro-economic factors (in this instance the 2008 economic crisis) indicates the important role that both income and income inequality play even in the health of high-income populations.

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OR.07 - More disease means health? Or is just a question of more bone? A case study from Medieval Leiria (Portugal)

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Historians know that the medieval ages were not so dark, but osteological indicators used by anthropologists can corroborate this idea? The adults exhumed from a Medieval cemetery in the Portuguese town of Leiria were taller than the adults that died in Lisboa and Coimbra in the beginning of the 20th century and were taller than most of the individuals exhumed from other Portuguese Medieval sites. As stature is used as a proxy measure to life conditions it would be expected that other stress indicators (e.g. enamel linear hypoplasia, Harris lines or cribra orbitalia) and diseases like tuberculosis were not common in São Martinho. However, the data show otherwise. All the osteological indicators mentioned but also trauma, dental loss and osteoarthritis have a high prevalence in Medieval Leiria.

In this study several hypotheses that could explain the data were tested (e.g. demographic structure, rural versus urban settings and the preservation state of the samples). Our analysis suggests that the preservation state of the samples need to be address whenever archaeological samples are compared.

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OR.08 - Lower levels of education and sick female hearts

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Introduction: Lower levels of education are associated with poverty and are more prevalent in women even in developed industrial countries. Low education is also correlated with poor health state.

Aim: This work aims at quantifying the sex-specific loss of cardiac health associated with lower education.

Methods: We examined 1269 German subjects (aged 50-87 years, 52% female) who had normal left-ventricular pump function but risk factors for heart failure. We examined the relationships between sex, education, left-ventricular diastolic dysfunction (DD) and heart-related physical performance (six-minute walk distance, 6MWD).

Results: 37% of men and 16% of women had higher education (P<0.001). DD was detected in 22% of men and 31% of women (P=0.001). The age-adjusted odds ratio to have DD was 1.47 for lower education (95%CI 1.06-2.03) and 1.39 (1.06-1.81) for female sex. This translates into one-third of excess DD in women attributable to lower education. Reduction of 6MWD associated with lower education was modest in men (–13m, P=0.13) but considerable in women (–45m, P<0.001; P=0.02 for sex-by-education interaction; age-adjusted).

Conclusions: Lower levels of education were found to be associated with an excess loss of cardiac function and physical fitness in women (compared to men) in a population of moderate health risk in a highly developed industrial country. We conclude that the policy of equal opportunities is not only a step towards guaranteeing the constitutional rights of women; it may also contribute to eradicating health risks associated with lower education which represents one of the last remainders of sex-specific poverty.

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OR.09 - Female minor refugees: Are they underprivileged by forensic age estimation?

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Introduction: Unaccompanied minors, including refugees, deserve particular care by the youth welfare office in Germany and many other countries. Authorities aim at excluding misuse of this service by adults. In case of unproven age and doubt about a concerned subject’s claim of minor age, forensic age estimation can be requested. Hand bone maturation status cannot prove adult age, but might confirm the claim of minor age and is, therefore, part of the assessment procedure.

Aim: Here we examine two methods established in forensic age estimation for possible bias and unequal treatment of female and male subjects.

Methods: Using 700 hand radiographs of subjects aged 6.4-19.1 years (54% female, growth delaying diseases excluded) obtained in clinical routine, skeletal age was determined by the atlas methods of Thiemann-Nitz (TN) and Greulich-Pyle (GP). Estimates were examined for bias and differences between sexes.

Results: Even though there was no overall bias at the disadvantage of subjects under assessment, the relative overestimation of age in females (compared to males) was 0.36 years (95%CI: 0.19-0.52, P<0.001) for TN and 0.17 years (0.01-0.33, P=0.04) for GP, which translates into a 2- to 3-fold higher risk of female minors of being misclassified as an adult.

Conclusions: Female minor refugees are at higher risk than males of missing the benefits from special care for minors and, in the worst case, of being sent back into war and poverty they have just escaped from. Here we also propose an improvement of age estimation formulas to overcome this inequality.

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OR.10 - Secular trends of somatic development in Abkhazian children and adolescents for the last decades

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Introduction: The study of secular changes in morphofunctional characteristics of children and adolescents remains one of the urgent subjects of human biology, fully supporting J. Tanner’s (1986) famous conclusion that growth is a mirror of the conditions in the society.

Aim: The aim of the present paper is to follow the changes in morphological characteristics of Abkhazian children in the context of social and political transformations.

Methods: Data on Abkhazian children from 9 to 17 (total number 1,000) collected cross-sectionally in the city of Sukhum in 1980, 2005 and 2012 were analysed. The program included about 30 measurements, evaluation of secondary sexual characteristics, and information on menarcheal age. Data on parental occupation, education, number of children per family were collected by questionnaire.

Results: Dramatic set of political and socio-economic changes took place in the Republic of Abkhazia in the period between the first and second series of measurements. This includes the end of the Soviet era, and the 1992-93 war between Abkhazia and Georgia. The results show that in 2005 the boys surpassed their counterparts measured in 1980 in stature and weight but showed lower values in chest circumference and some other characteristics. The girls were much more retarded in all measurements. Menarcheal age in both generations remained 13.0. The results of 2012 investigation show the same tendencies. Menarcheal age equals 12.9 years.

Conclusions: It can be concluded that the consequences of war and economic hardships are reflected in growth and development of Abkhazian children, being more pronounced for the girls.

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OR.11 - What environmental and psychosocial factors should be addressed to increase participation of Bangladeshi women in moderate physical activity: Findings from focus group discussions

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Introduction: Bangladeshi women have the lowest rate of participation in moderate-vigorous physical activity (PA) among the ethnic minority communities living in the UK. Some barriers to participation are understood but there is little evidence of what factors need to be addressed to change health behaviour and encourage participation.

Aim: Following Intervention Mapping Protocol, the study aimed to design and implement a tailored PA intervention for Bangladeshi women living in Charnwood Borough. It examined the barriers to participation perceived by the group. It also identified the changes required to encourage participation.

Methods: Fifty-eight Bangladeshi women took part in one of nine focus group discussions. Interview questions were developed based on the literature. Discussions were audio recorded and translated into English. Content analysis and thematic analysis were used to interpret data.

Results: Nearly all women reported their unawareness on the national guidelines for physical activity. However, they knew the health benefits of doing regular PA. Environmental barriers identified for PA included lack of ‘women only’ sessions, appropriate supports and privacy; and cold weather. Psychosocial barriers included family responsibility, time, cost and lack of companion. Participants agreed that advocacy of health benefit to family members would be an effective facilitator. Group participation being a means of socialization was considered as a good motivating factor. Participants believed that by making PA sessions enjoyable and boosting their confidence level would encourage their participation. Just over half the participants expressed their readiness to join an appropriate PA session.

Conclusions: An appropriate intervention has been implemented based on the findings.

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OR.12 - Health status among families of different cultural backgrounds in England: Fieldwork logistics and cultural diversity

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A strong research design, involving human participants, needs to have a feasible and well organized fieldwork logistic. Although it is all researchers’ wish to collect a strong and high quality data set, there are various limitations in practice especially when the study involves public participation.

In this paper, we present and discuss the logistics of conducting biocultural research among families residing in Leicestershire, England. These families come from various cultural and religious backgrounds and our fieldwork strategies had to be adapted to these specificities. We took anthropometric measurements, conducted interviews and assessed the physical activity level of 50 children (aged between 7 and 11) and their parents (mother or mother and father). During the data collection, we faced several setbacks because of unexpected feelings of uneasiness among some of the participants. What it seemed to be perfectly well accepted among one family was seen as suspicious by another, even though the project had received full ethical approval and the participants had been informed in detail about what the research entailed and their right to withdraw at any time.

When collecting data involving participants from different cultural we should allow increased time to deal with unexpected constraints even when we feel we know the groups in question.

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OR.13 - Effectiveness of community health workers in promoting exclusive breastfeeding in Nairobi slums

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Aim: Very poor infant feeding practices are documented among urban poor mothers, with exclusive breastfeeding for six months at 2%. The aim was to test the effectiveness of a home-based intervention using Community Health Workers (CHWs) on exclusive breastfeeding for six months in urban poor settings in Nairobi, Kenya.

Methods: Cluster-randomized controlled trial in Nairobi slums, involving 14 clusters, half in the intervention and the other half in the control arm, targeting 800 mother child pairs. Pregnant women were recruited and followed up till their respective children were aged one year. Experimental intervention involved regular home-based nutritional counselling visits by CHWs trained specifically on maternal infant and young child nutrition (MIYCN), while control group received optimized primary health care by CHWs. Both groups also received information materials on MIYCN, distributed by the CHWs. Data on breastfeeding practices were updated every two months since birth. Analysis involved testing of differences in exclusive breastfeeding by intervention status.

Results: A total of 1110 mother-child pairs were included in the study. There was no statistically significant difference in exclusive breastfeeding for six months between the two arms (54.5% vs. 56.1% respectively, p=0.849). However, the prevalence increased from virtually nothing (2%) at baseline to over 50% in both arms, indicating potential effectiveness.

Conclusions: Results indicate potential effectiveness of the intervention in improving exclusive breastfeeding for six months, from virtually nothing to over 50% in both
groups. While this study contributes to implementation science knowledge, the study demonstrates a difficulty in finding an appropriate counterfactual for community-based educational interventions which needs more careful thought. Nevertheless, this study indicates a great potential for use of CHWs as an effective model of promotion of exclusive breastfeeding in urban poor settings.

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**Trial Registration:** ISRCTN83692672

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OR.14 - Changing temporal associations of SES and cardiometabolic conditions with modernization among Samoans

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Aim: To describe the changing temporal patterns of association between SES indicators and cardiometabolic risk factors among modernizing Samoans from the 1970s to 2010.

Methods: Survey data from American Samoa in 1976-78, 1990, and 2002, and from Samoa in 1979–1982, 1991, 2003, and 2010, on educational attainment, occupation, and a household assets index are used to assess socio-economic status (SES). Body mass index, blood pressure, cigarette smoking, fasting glucose and lipids are used to assess cardiometabolic risk factors. Statistical analyses focus on changes between SES and cardiometabolic risk factors over time in the two Samoan polities, taking into account age and sex.

Results: Earlier in modernization there is a positive association between SES indicators and cardiometabolic risk which gradually flattens then in the early 21th century becomes a negative association. This patterns is especially strong among men.

Conclusions: The dynamic pattern of associations between SES and cardiometabolic conditions during economic development in the Samoaas supports the change in perspective from one of understanding how traditional ways of life and individual exposures change and influence population health, to a focus on how absolute and relative poverty form and are sustained at the global, national and local levels and their effects on cardiometabolic health.

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OR.15 - War and its effect on the changes in lifestyles: a case of Croatia

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Besides numerous obvious tragic consequences, war in Croatia has affected and caused a change in lifestyles. This was caused by many factors, including relocation of local population to new areas, which often caused direct changes in nutritional habits. This process was further accelerated and continued after the war, with globalization trends that caused break up in traditions. Weak economy, cheaper foods and easy access to it all resulted in much higher intake of red meat and industrial foods in general. Additionally, the levels of physical activity decreased, as mechanization and use of chemicals in agriculture decreased the need of physical labour in food production. All this is reflected in overall health status and caused numerous types of common diseases, and MS in particular. Low socioeconomic status of inhabitants of East-Croatia (the area heavily affected by war) is probably one of the reasons of rapid growth of MS. Research has shown several major trends: 1) war was one of the most important factors causing stress and weak socioeconomic situation, especially in East Croatia, 2) globalization trends – Croatia is a traditional country in which a change in life ways happened very rapidly, especially on the islands; and 3) traditional-historical level – more traditional diet that was based on foods such as oily fish, and corn bread is often perceived as a symbol of low standard, as red meat and white bread was in the past eaten by the more wealthy elite.

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OR.16 - Urbanization and mother-child health – a multidisciplinary international study

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In the context of the rapid urbanization worldwide the task of improving urban health is of increasing importance, requiring a multidisciplinary approach. In this paper we present the research of the Center of Medicine and Society, Freiburg, Germany, integrating biological concepts of health especially on mother and child health with an emphasis on urban health.

The Center for Medicine and Society is comprised of the faculties of Biological Anthropology, Mental Health, Environmental Medicine, Palliative Care and Medical Sociology & Psychology (University of Freiburg, Germany). Within the frame of the Pan University Network of Global Health together with the leading research partners School of Public Health and Family Medicine, Faculty of Health Sciences (University of Cape Town, South Africa) and the Department of Biobehavioral Health at the Penn State University we are exploring determinants and spatial disparities of health and disease in the model city Cape Town. The subsequent aim is to design new interdisciplinary strategies for improved health in urban areas. This cross-sectional descriptive-exploratory study focuses on gathering and analysing data in Cape Town combining the results of all participating disciplines in a gap analysis.

In this paper we focus on mother and child health (MHC) care and describe the existing data on biological and sociocultural risk factors for mothers and children and the availability of MHC services in Cape Town. The field of mother and child health is well documented for the country of South Africa. Specialized information for the city of Cape Town or even further for the health districts of Cape Town are hardly available and accessible. Despite that a first overview about mother and child health and the identification of risk factors in the city Cape Town could be achieved.

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OR.17 - Increases in poverty levels lead to worse health outcomes and inequalities. Is it always like this?

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Background: The economic downturn that has unfolded in recent years has brought new social risks to the most affected countries. Unemployment, wage reduction and poverty are markers of a new social and economic order with foreseeable health consequences.

Aim: To analyze socioeconomic inequalities in premature mortality and their evolution during the 2001-2011 period and explore the evidence for a strengthening or weakening of these inequalities.

Methods: This is an ecological study carried out in the Lisbon Metropolitan Area (LMA), Portugal. We used indirectly standardized premature mortality ratios and a composite index of socioeconomic deprivation (calculated at the parish level and based on three standardized census variables - overcrowding, low social class and male unemployment). Pearson’s product moment correlation coefficients and ANOVA were used to test associations and variability between variables, respectively.

Results: our findings show that the population living in extreme deprivation conditions increased during that decade and that increasing levels of deprivation are associated with health degradation. Moreover, between 2001 and 2011, premature mortality worsened and became more extreme, although the socioeconomic inequalities in mortality decreased.

Conclusions: We conclude that in the LMA, health degradation is selective, affecting only the higher social classes; therefore, social inequalities in health tend to decrease, but without health gains. On the contrary, there is a greater tendency to level health “down” at the cost of the health loss of the most affluent groups.

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OR.18 - Urbanization and mother-child health – a multidisciplinary international study

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Much research on risk factors for cardiometabolic diseases focuses on individual health behaviours, such as smoking and diet. These behaviours may be socially patterned by early exposure to social disadvantage, though few studies have prospectively assessed this topic. We investigated whether childhood social disadvantage was associated with health behaviours 40 years later using prospective data from the National Collaborative Perinatal Project, started in 1959-1966, with follow-up in 2005-2007.

The child’s social environment (through age 7) was assessed using an index that combines information about socioeconomic status (e.g., poverty level) and family stability (e.g., parental marital status). Logistic and linear mixed models investigated associations between social disadvantage and unhealthy behaviours including diet (unhealthy foods/week subtracted from healthy foods/week; <60th percentile is less healthy diet), 2 alcohol servings/day, and (log)BMI. All models accounted for age, sex, race, and study site, and tested interactions between gender and childhood social disadvantage.

In the total sample, relative to low disadvantage, higher disadvantage was associated with 16% greater median BMI (p=0.0003), 6-fold greater odds of smoking (p=0.001), but was not associated with diet. Women with high childhood disadvantage had 10-fold greater odds of heavier drinking (p30min/day (p=0.29). As poor health behaviours are linked with higher cardiometabolic risk, these findings suggest childhood social disadvantage may contribute to adult cardiometabolic disease by establishing trajectories of certain unhealthy behaviours.

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OR.19 - Do stress biomarkers track poverty, stress, and trauma?
Evaluating war-affected youth

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Aim: Are biomarkers useful measures of adversity in contexts of war and forced displacement? Do they help strengthen the scientific evidence base regarding the efficacy of programmatic interventions in humanitarian settings? We are evaluating a brief, replicable psychosocial program delivered to Syrian refugee and Jordanian youth, extending impact evaluation beyond the usual means of assessment by self-reports.

Methods: We collected pre- and post-data on 13-17 year olds, matching intervention youth and controls (n=202). We used multiple indicators of (i) psychosocial stress and mental health (Perceived Stress Scale; Distress and Human Insecurity Scale; Strength and Difficulty Questionnaire) and (ii) physiological stress (scalp hair cortisol; blood spot cell-mediated immune function; blood pressure). We examined psychosocial and physiological stress by nationality, gender, vulnerability to poverty, exposure to trauma, and program modality.

Results: All self-reports – stress, insecurity, and mental health difficulties - show striking and consistent differences, with Syrian youth reporting more distress than Jordanians, girls reporting more than boys, and highly vulnerable youth more than counterparts. While Epstein-Bar Virus antibodies track none of this variation, log cortisol data reveal the same patterns by nationality, gender, and vulnerability, and are correlated with lifetime trauma events in Syrian youth.

Conclusions: There are many challenges to conducting robust health evaluations in refugee and war-affected contexts. Our data offer insights on ways to measure the biology of poverty, stress, and trauma for two populations of youth - one displaced as a result of the Syrian crisis, the other host to a numerous refugee population.

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OR.20 - The Challenge Hypothesis: Testosterone Reactivity and Social Defeat in Human Females

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Introduction: Social subordination can lead to deleterious neuro-endocrine effects in humans. Within the theoretical framework of the challenge hypothesis, studies exploring chronobiological changes in testosterone (T) frequently demonstrate increased T in winners of status encounters and a reduction in T following defeat. It has been claimed this disparity in T levels can have an effect on subsequent status related behaviour. However, despite using both physical and non-physical competitive tasks in a range of settings, the findings are equivocal and the subjects are nearly always male. Given that the burden of poverty falls disproportionately on women and the suggestion that female T may also be responsive to social stimuli there is a pressing need to understand these effects in women.

Aim: Incorporating methodological refinements in T measurement and sampling protocol, we sought to examine the dynamic relationship between T and a non-physical dyadic status encounter.

Method: Twenty-two females competed in a dyadic non-physical four-round knockout tournament. A comprehensive sampling schedule was utilized to collect salivary samples for baseline, pre- and post-competition phases. Following extraction with diethyl-ether, T was quantified using an indirect ‘in house’ enzyme-linked immunosorbant assay (ELISA). Assay sensitivity was <0.5pg/mL; intra and inter assay coefficients were 3.2% and 7.1% respectively; cross reactivity with related compounds was minimal.

Results: Compared against time-matched baseline levels, pre-competition T appeared un-responsive. However, at 3hrs post-competition, T levels had risen 35% in winners and fallen 4% in losers.

Conclusions: Our results support the hypothesis that, similar to males, the female endocrine system is responsive to status encounters. Results are discussed in relation to limitations in previous research and Mazur’s biosocial theory of status.

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OR.21 - Who Eats more Fast Food in America: The Poor, Middle Class or Rich?

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Aim: Several studies find greater fast food access in low SES areas, contributing to the perception that the poor eat fast food more frequently than the middle class and the wealthy. Indeed, some anti-obesity policies aim to reduce fast food consumption specifically among lower income Americans. Most previous studies of the association between fast food and SES in the U.S. rely on data that are at least a decade old and do not include measures of wealth. This paper provides an updated analysis of patterns in fast food consumption by both income and wealth.

Methods: We use data from the 2008 and 2010 waves of the National Longitudinal Survey of Youth (NLSY79) to test whether fast food consumption is more frequent among low SES than higher SES individuals. In addition to measuring SES with income, this is the first study to include a comprehensive measure of wealth.

Results: The results show fast food is eaten more frequently by middle class than poor individuals, however the variation across the SES groups is small. We also find evidence that nutritional awareness and soda drinking habits have important associations with fast food consumption.

Conclusions: Fast food consumption does not much vary by income and wealth, so policies to reduce fast food intake among low income Americans are unlikely to reduce socioeconomic disparities in obesity prevalence and the public expenses of obesity-related diseases. Policies that raise nutritional awareness and reduce soda consumption are more promising policy avenues to reduce obesity.

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OR.22 - Effects of poor neighbourhood quality on maternal and offspring cortisol and methylation

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Poor neighbourhood quality has been consistently associated with poor health, independent of individual health behaviours. Neighbourhood quality could impact health through chronic activation of an individual’s stress physiology, which may in turn alter the development of stress physiology in that individual’s children. Here I assess the relationship between neighbourhood quality and maternal self-rated health and cortisol in pregnancy, as well as offspring cortisol and methylation patterns at a gene associated with cortisol functioning, NR3C1, measured shortly after birth.

Data come from an ethnically and socioeconomically diverse sample of women and their children from Auckland, New Zealand (N = 64). Neighbourhood quality was based on perceived safety of personal property, personal safety, friendliness of neighbourhood, quality of schools, and access to recreational areas. These variables were analysed individually as well as in a composite measure of overall neighbourhood quality.

Women living in neighbourhoods where they felt their property was less safe or where general neighbourhood quality score was lower had poorer self-rated health and elevated morning cortisol, and had infants with elevated cortisol reactivity. Lower neighbourhood quality score was also associated with altered methylation at NR3C1 in offspring. These results are the first to report an association between cortisol levels in pregnancy and in young infants in relation to neighbourhood quality, and suggest that both measures are associated with perceived safety in particular.

These associations provide insight into the potential biological mechanisms underlying the relationship between neighbourhood quality and health, and suggest that bad neighbourhoods can have health effects spanning generations.

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OR.23 - ???

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Aim: ...

Methods: ...

Results: ...

Conclusions: ...

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Poster Presentations
**PO.01 - The Role in Women in Water Sanitation and Hygiene (WASH) in Bauchi State, Nigeria**

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**Aim:** This study explores current Water Sanitation and Hygiene (WASH) activities to identify factors that influence current roles, and their impacts on women and girls in Bauchi State, Nigeria. This can improve understanding of the effectiveness of such roles in the sustainable development of PHC (Primary Health Care).

**Methods:** A mixed methods approach involving a systematic review of 4 selected core articles, complimented with semi-structured interviews with 5 participants was used to extract data, identify recurrent themes and WASH knowledge gaps, and the roles rural women play in the sustainable development of PHC in Bauchi State, Nigeria.

**Results:** The systematic review revealed the extent of the roles women play and how these affect the sustainability of WASH programmes. However, no study adequately integrated the roles women play in WASH within the sustainability of PHC programmes in Bauchi State. Also, no poverty indicators are available to help understand these issues. Gaps identified through the review constituted themes for the interviews.

Interview participants suggested that women could play significant roles in WASH owing to the fact that they are in charge of WASH within households. However, evidence from the interviews revealed that they are not sufficiently involved at various stages of community WASH programmes.

**Conclusions:** The study underscores the important role women play in the sustainable development of WASH for Health care programmes, and suggests how current limitations can be addressed. Therefore a model was developed to demonstrate how this could be achieved. With appropriate empowerment and education interventions, rural women can be supported to play significant roles in WASH.

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PO02. Exploring Poverty, Skeletal Biology and documentary evidence in 19th-20th century Portugal

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Inferring poverty from human skeletal remains is a difficult task because skeletal changes caused by inequalities in wealth are mediated by physiological and biomechanical stress, and ill-health events. In recent years identified skeletal collections have become resources used in bioarchaeological research whilst controlling for the sex and age at death of individuals which impacts negatively upon the accurate interpretation of biological and wealth status of past populations. This has favoured an increased rigour in data analysis and interpretation. Emphasis has also been placed on the occupations listed at death, used as proxies for economic status. This study explores the presence of osteological makers of occupation – specifically degenerative joint changes (DJC) – between historically framed occupational groups whilst controlling for age at death, and the occupational groups were used as proxies for the individuals’ socio-economic status.

A total of 603 individuals, distributed into seven occupation categories were tested. The results showed a difference in age distribution between the occupational categories and that age was a contributing factor to DJC; differences between occupational groups were only found for the hips, right shoulder and ankle. However, the differences found were not necessarily representative of low versus high socio-economic status. Furthermore, this study showed the limitations associated with the documentary evidence as this does not necessarily assist in the identification of economic variables, such as poverty for human skeletal remains: a limitation that is possibly present for other remains.

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PO.05 - Reproductive history and poverty in women from Merida, Mexico

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Introduction: An early start of their reproductive history affects health and reproductive success of women as well as their chances to keep on at school and to have a personal and social development.

Aim: Our objective is to assess the differences in age at first pregnancy (AFP), number of pregnancies (NP), number of alive born children (ABC), and number of abortions (NA) by three poverty indicators in a sample of 774 women, 26 to 61 years of age, who participated in a research carried out in Merida, Mexico, in 2010 and 2011.

Methods: We compared the means of AFP, NP, ABC and NA by crowding (no crowded vs. crowded households), maternal educative backwardness (basic school or higher vs. unfinished basic school) and health services (access vs. no access).

Results: Our preliminary findings are that women in poverty situation had significant lower AFP and higher NP and ABC than women that had better socioeconomic conditions. No significant differences were found for NA between these two groups of women.

Conclusions: Our results suggest that the poverty indicators we used are associated to a reproductive pattern characterized by an early start of reproduction and higher number of pregnancies. These results will be analysed using more robust statistic methods and related to data on growth and nutritional status of a sample of the children of these women.

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PO.06 - Blood pressure and overweight/obesity and parental education

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Introduction: Children’s primary hypertension exhibits strong correlations with various factors among which overweight and obesity assume a considerable role. Overweight and obesity are associated with low parental education which is more common in poorer populations. High prevalence of overweight/obesity (OVOB) has been observed in Portuguese children.

Aim: The aim of this study was to examine the association between OVOB with current blood pressure (BP) in school children aged three to ten years old, and to explore the relation with parental education and food habits.

Methods: A Portuguese cross sectional study was conducted during 2009. Height, weight and BP were measured. A total of 2320 children were observed. BMI categories of overweight and obesity were defined according Cole et al. (2000) BMI cut-off points. The revised BP values proposed by Task Force on Blood Pressure Control in Children were used to define prehypertension and hypertension. Prehypertension was defined as systolic BP (SBP) and/or diastolic BP (DBP) ≥90th and <95th percentiles, and hypertension was defined as SBP and/or DBP ≥95th percentile for sex, age and height. Two categories of BP were established, normal (NBP) and prehypertension+hypertension (PHH).

Results: The prevalence of PHH was 9.2%. The BP averages were 93.3±11.4 mmHg for SBP and 57.9±8.4 mmHg for DBP. The frequencies of children’s BP category were significantly different for children’s BMI categories and parent’s education. OVOB and PHH were related with parental low education.

Conclusions: It is important to develop community interventions targeting parents to improve their knowledge to promote the health of their children in order to make them aware about the importance of healthy habits to reduce PHH and overweight in children.

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PO.03 - The nutritional cost of poverty in Merida, Mexico

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Introduction: In Mexico, the percentage of population in poverty conditions is still alarming even when the socioeconomic conditions have improved in the last century. Near of 50% of Mexican people do not meet their basic needs of feeding, education, household infrastructure and health services.

Aim: To analyse the anthropometric differences according to several socioeconomic indicators associated to poverty in a socioeconomic diverse sample of 841 individuals (9 to 17 years of age) from Merida, Mexico, measured between September 2008 and December 2009.

Methods: Z-score values of height, sum of tricipital and subscapular skinfolds (SumSkf) and muscle and fat arm areas (AMA and AFA) were compared between categories of type of water available at home (non-piped vs piped), crowding (crowded vs non crowded houses), maternal education (primary or less vs secondary or higher) and family income (low, medium and high). Student t-test and one-way ANOVA analyses were applied.

Results: Individuals in poverty conditions show significant lower values of height (p<0.001) and AMB (p<0.05) according to the socioeconomic indicators; being the differences in height of ~1SD. Children belonging to families with poor maternal education and low income presented higher values of SumSkf.

Conclusions: Individuals of poor families exhibited substantial deficits in linear growth and a higher risk of adiposity; conditions that increase the risk for both their current health status and their adult health.

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PO04. The nutritional cost of poverty in Merida, Mexico

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CINVESTAV, Mexico

Introduction: In Mexico, the percentage of population in poverty conditions is still alarming even when the socioeconomic conditions have improved in the last century. Near of 50% of Mexican people do not meet their basic needs of feeding, education, household infrastructure and health services.

Aims: To analyse the anthropometric differences according to several socioeconomic indicators associated to poverty in a socioeconomic diverse sample of 841 individuals (9 to 17 years of age) from Merida, Mexico, measured between September 2008 and December 2009.

Methods: Z-score values of height, sum of tricipital and subscapular skinfolds (SumSkf) and muscle and fat arm areas (AMA and AFA) were compared between categories of type of water available at home (non-piped vs piped), crowding (crowded vs non crowded houses), maternal education (primary or less vs secondary or higher) and family income (low, medium and high). Student t-test and one-way ANOVA analyses were applied.

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Conclusions: Individuals of poor families exhibited substantial deficits in linear growth and a higher risk of adiposity; conditions that increase the risk for both their current health status and their adult health.

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PO.07 - Cultural Identity, Health, and Poverty in the Confederated Tribes of Siletz Indians

Savannah Martin

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An ethnographic inquiry into the socioeconomic status and its relationship to cultural identity, the aim of this study is to uncover how poverty has become ingrained as a quality inherent to cultural identity as a Siletz Indian. Semi-structured interviews are conducted with members of the Confederated Tribes of Siletz Indians from urban and reservation settings, and perceptions of identity, poverty, and health were documented.

It was found that socioeconomic status is an important factor in cultural identity, and it influences how individuals perceive themselves and the health issues that affect their communities. Knowledge about this relationship between cultural identity, health, and socioeconomic status can help to inform the way that prevention and treatment efforts are tailored to be more effective in Native American communities. Additionally, these results can help guide future research regarding the origins of many diseases that find their roots in the environment of poverty and community attitudes surrounding disease occurrence and treatment.

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PO.08 - The effects of environmental conditions on the development of sexual dimorphism

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Introduction: Exposure to poor environments, malnutrition, and labour during childhood can lead to stunted height and increased mortality. Studies of skeletal samples from Industrial Era Europe show that height is stunted when compared to Medieval samples, suggesting living conditions were more strained. Literature suggests that while poor conditions negatively impact all children, boys may be particularly disadvantaged, because girls can reserve nutritional components buffering them during times of stress.

Aim: This study examines skeletal growth in three Industrial European skeletal samples. Femur length was measured in known-sex juveniles (0-18 years) from low, middle, and high socio-economic status (SES). I hypothesize that 1) femur lengths will be shorter when compared to a modern, healthy reference sample, and 2) boys' growth will be impacted more negatively than girls, resulting in lower sexual dimorphism, especially in lower SES samples.

Results: Results show significantly shorter femora in all three samples, with stunting increasing throughout childhood, confirming the first hypothesis. Young boys (6-8 years) in middle and high SES samples exhibit more stunting than females (z-scores <3), and sexual dimorphism is not significant amongst any age group, with the exception of lower SES adolescents, supporting the second hypothesis. Boys in all samples, however, experience catch-up growth, while girls show significantly more stunting.

Conclusions: Evidence of catch-up growth in boys and not girls suggests gender preference with possible access to better foods and healthcare. Historical research of this time period does suggest that adolescent boys often received higher quality food than girls, supporting the results of this research.

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PO.09 - Childhood health in Roman Britain: skeletal evidence for an impoverished peasantry?

Anna Rohnbogner

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An ethnographic inquiry into the socioeconomic status and its relationship to cultural identity, the aim of this study is to uncover how poverty has become ingrained as a quality inherent to cultural identity as a Siletz Indian. Semi-structured interviews are conducted with members of the Confederated Tribes of Siletz Indians from urban and reservation settings, and perceptions of identity, poverty, and health were documented.

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PO.10 - Nutritional status of under-five children in poor rural areas of Quinara, Guinea-Bissau

Vitor Rosado-Marques, Ana André, and Raquel Silva
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**Aim:** Guinea-Bissau is one of the poorest countries in the world, ranking 177 out of 187 on the 2013 Human Development Index with 58% of the population in severe poverty, where children and women are the most affected. Poverty contributes to malnutrition, and children who are malnourished are much more susceptible to the infectious diseases. The aim of this study is to assess the prevalence of undernutrition in a sample of under-five children living in rural Guinea.

**Methods:** The sample was composed of 288 children (147 boys and 141 girls) living in 25 tabancas of the Parque Natural das Lagoas de Cufada (PNLC), in the Quinara Region. Fieldwork procedures included height/length and weight using standardized techniques. Undernutrition was determined using the WHO Anthro software and data was analysed using the SPSS software.

**Results:** General growth retardation was observed as follows: 22% of stunting, 12% of underweight and 7% of wasting. Contrarily to the prevalence of stunting and underweight, the prevalence of wasted children was higher than the regional average. Stunting increased with the age and was the highest in the 24–60 month age group (30.6%), while the prevalence of wasting was higher in the 6–24 month age group (12.4%). The extent of malnutrition was significantly higher in boys than in girls (P<0.05).

**Conclusions:** Based on WHO criteria, the studied population showed higher prevalence of wasting and stunting and moderate prevalence of underweight. It is urgent to create conditions to identify situations of malnutrition and food insecurity in the PNLC’s communities and subsequently refer them to health care facilities.

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PO.11 - Diet and Health in Ancient Egypt as a View to Present Issues of Nutrition

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Ancient Egypt is well known for monumental architecture, elaborate tombs and pharaohs, and as a powerful empire of the ancient world. There have been fewer investigations of the everyday individuals who lived during the earliest periods of the burgeoning kingdom. This study analysed the remains of >700 individuals who lived in Egypt (c. 3150 – 1674 BC) using skeletal markers of biological stress.

Results show that the health of the population declined over periods that historically appear to have been economically successfully. It is hypothesized that the increase in cereal consumption and decrease of fresh produce and meat reduced the nutritional components needed to maintain good health. Lessons from past can be applied to contemporary populations; today malnutrition, nutritional deficiencies, and food insecurity are addressed by global organizations in an effort to improve the nutritional quality of diets of the impoverished and support local producers for long-term sustainability. The consumption of inadequate foodstuffs in the past, which contributed to poor health in ancient Egypt, highlights the importance of not only food supply but of adequate nutrition in the diet.

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PO.12 - Female salivary testosterone: the influence of circadian dynamics on sampling strategies in bio-behavioural research

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Introduction: Little emphasis has been placed on the relationship between poverty and testosterone (T). Those studies which have been conducted tend to consider putative basal T levels which are then correlated with low socio-economic status or behaviours claimed to be concomitant with poverty. However, androgens are not static but highly labile and levels are modified in response to a wide range of social stimuli, especially those related to status. There is an absence of reliable information concerning detailed circadian T in females, particularly the biologically active free component, as measured in saliva. Consequently, studies investigating the relationship between T and female behaviour have formulated methods that tend to employ single time-point sampling protocols which are likely to be unsuitable.

Aim: We report two circadian studies which provide a comprehensive picture of the daily pattern of female salivary free T over both a single and two non-consecutive days.

Methods: Subjects in study 1 were 73 healthy females. Eight salivary samples were collected throughout the course of the day; one every two hours from 9am until 11pm. Following the same protocol, 53 of the same participants also collected saliva on a second day. T concentration was determined with an in-house indirect ELISA. Assay sensitivity was <0.5pg/mL; inter and intra-assay coefficients were 3.5% and 8.4% respectively.

Results: T concentration demonstrated a clear circadian profile with a percentage change from mean 9am levels reaching 34.4% at 9pm. Perhaps more importantly, throughout the course of the day T concentrations were highly variable with episodic fluctuation of individual data points exceeding 100% of 9am levels. Results indicate an often low level of reliability (r=0.1 to r=0.48) across days.

Conclusions: Together these results suggest that females exhibit not only diurnal variation in T but episodic or random fluctuation at levels which call into question the use of single T measurements in bio-behavioural studies.

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PO.13 - Seasonal changes of non-shivering thermogenesis during mild cold exposure

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Aim: The physiological function of non-shivering thermogenesis (NST) has been investigated, and some studies have mentioned the importance of NST with respect to human cold adaptation. The present study aimed to clarify individual and seasonal variations in NST via mild cold exposure.

Methods: Seventeen Japanese male university students participated in the present study during summer and winter. The climate chamber used was programmed so that ambient temperature dropped from 28°C to 16°C over an 80-min period. Physiological parameters of test subjects were recorded during the experiments.

Results: Increases in oxygen intake (VO2) during cold exposure were significantly greater without shivering in winter than they were in summer. Respiratory exchange ratio (RER) was significantly lower during thermoneutral baseline and cold exposure in winter than in summer. In addition, there was a significant negative correlation between ΔVO2 and ΔRER.

Conclusions: Increase of VO2 without shivering indicated increase of NST, and decrease of RER depends on the metabolism of fat in winter. These results suggested that NST activity was activated by seasonal acclimatization, and individual variation of NST depends on individual variation of fat metabolism.

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PO.14 - Maya Guatemalan children in refugee camps in Mexico. How bad is their growth status?

Aya Ueno, Barry Bogin, Faith Warner, and Maria Ines Varela-Silva
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Introduction: Refugee camps are characterised by rapid mass migration, usually with insufficient food, water and nutrition, causing disease and malnutrition in the affected populations (Shears et al., 1987). Forced displacement is harmful for many reasons: little or no time to prepare for the journey; loss of resources such as food and family; lack of access to humanitarian aid; high rates of malnutrition, and psychological stress from displacement, among many others (Clarkin 2012).

Aim: The aim of this presentation is to assess the growth status of Maya children from Guatemala who have been displaced in refugee camps in Mexico.

Methods: This cross-sectional sample was composed by 340 Maya Guatemalan children (K‘iche, Mam/Kanjobal, or Q’eqchi) with ages between one month and five years of age. These children were placed in a refugee camp in Mexico, organised on the basis of their village of origin in Guatemala. Height, weight, head circumference, triceps and biceps skinfolds, and mid-arm circumference were collected using standardized procedures (Lohman et al 1983). The raw anthropometric data was Z-scored against the World Health Organisation (WHO) growth standards.

Results: More than 60% of the children were stunted, 18.7% were underweight and 3.4% were wasted. Significant differences between Maya groups in the stunted category (X2=0.013) with 42% of stunting among the K‘iche children versus 62.33% and 65.11%, respectively, among the Mam/Kanjobal and Q’eqchi. There were no significant differences for each categories of malnutrition between the sexes (p<0.05).

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PO.15 - Sex differences between total joint replacement outcomes in osteoarthritis patients

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Aim: Osteoarthritis (OA) is a major public health concern and can lead to pain, stiffness and a loss of mobility. These symptoms can have a large impact on quality of life. OA is the most common chronic joint condition in older adults and a leading cause of disability in this age group. As well as increasing age, sex is also a risk factor for OA. Women are at a higher risk of OA and also report higher pain levels and disability than males with this condition. However, some research shows that men are more likely to be referred for a total joint replacement (TJR) than women. Currently a TJR is the only long-term treatment for severe OA. Furthermore, some studies suggest that men are at a higher risk of complications such as infection and other surgical complications as a result of TJR surgery. This study aimed to examine outcome measures of TJR satisfaction to identify differences between men and women in a single region.

Methods: 852 individuals from Nottinghamshire who had undergone a TJR for severe OA will be studied. Questionnaire data will be used to assess TJR outcomes and satisfaction.

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PO.16 - Maternal depression, stress and income levels are associated with infant BMI in African-Americans

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African-American children have a high prevalence of obesity. The causes of this health disparity are poorly understood. Rapid weight gain in early infancy is associated with later obesity. Identifying factors associated with rapid infant weight gain, especially among African-Americans, is key to unraveling disparities in childhood obesity and its consequences. The Infant Growth and Microbiome (iGram) Study is a prospective longitudinal study of African-American pregnant women and their infants aimed at understanding the contextual and biological factors associated with rapid weight gain in the first year of life. Here we present preliminary results on interim data.

Healthy, pregnant, African-American women and their healthy infants were eligible. Mothers were interviewed in their third trimester (3T), and infants were assessed within the first 4 days of life and monthly thereafter. Household income, maternal education, enrolment in government food, housing and medical insurance programs was obtained at enrolment. The Center for Epidemiologic Studies Depression Scale (CES-D) assessed symptoms of depression at 3T, 2 and 6 months after delivery. The Perceived Stress Scale (PSS) and food insecurity questions were administered at 3T and 6 months. Infant weight and length were measured and converted to Z-scores using the WHO growth reference.

To date, 116 women (58% obese) and 110 babies (51% female) have enrolled; with completed visits at 4 months for 66 infants and at 6 months for 45 infants. Maternal education had a wide range (10% without high school degrees; 36% completed some or all college coursework), but income was low (56% with household income <$30,000) and 83% received government assistance for medical insurance, nutrition, housing, childcare or social security benefits. 30% reported food insecurity. Maternal education level was negatively related to CES-D score (p=0.0014), and marginally negatively related to PSS score (p=0.06). CES-D (p=0.008) and PSS score (p=0.006) were significantly associated to food insecurity. At 6 months, CES-D Score
significantly declined (14.9±1.2 vs 9.5±1.2, p=0.0002), as did PSS-Score (15.9±1.1 vs 12.6±1.2, p=0.009). Overall, the infants were small at birth (weight-Z -0.4±1.0, length-Z -0.4±1.2, BMI-Z -0.3±1.0, n=110), with rapid catch-up compared to the WHO reference by 4 months of age (weight-Z 0.1±0.9, length-Z -0.1±1.1, BMI-Z 0.3±1.0, n=66). Maternal depression, perceived stress and household income were significantly associated with infant BMI-Z at 6 months (Spearman r=0.46, p=0.002; r=0.37, p=0.01; r=-0.36, p=0.02, respectively), but not at younger ages. Government assistance and maternal education were not associated with infant BMI-Z. Maternal obesity was positively associated with infant weight-Z at birth only (-0.7±0.8 vs -0.2±1.0, p=0.01).

These preliminary findings suggest that the effects of poverty, maternal depression and perceived stress are not evident at birth, but increasingly have effects on weight gain during the first 6 months of life. These results require confirmation as data collection proceeds.

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