

particular poverty-related vulnerability towards disability. Overall, international immigrants were a complex and heterogeneous group and their social determinants for disability require further consideration in future health policy interventions in Chile.

## Methods and miscellaneous

### P65 A NEW INDEX TO ASSESS THE IMPACT OF COLLINEARITY IN EPIDEMIOLOGICAL RESEARCH

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**Background** The problem of collinearity due to high correlations between explanatory variables in multiple regression is often overlooked in epidemiological research. The assumption that covariates are independent implies that all pair-wise covariate associations should be negligible—an unlikely scenario for biological and epidemiological data. Small but significant departures from the assumption of independence can severely distort the interpretation of a model and the role of each covariate. If the relative impact of collinearity on the estimates is not understood, these effects can potentially obscure the conclusions of the study.

**Methods** The impact of collinearity must be assessed in relation to the model environment. Factors such as the relation of the response with the predictors, the sample size and the variation of the covariates each have the potential to exacerbate or relieve the symptoms of collinearity. We present a novel approach to assessing the overall uncertainty in the model estimates, which adjusts in relation to these factors. The index will aid the researcher in the decision towards whether a result is of biological relevance or if it is a consequence of the uncertainty generated by collinearity.

**Results** We consider data from a paper by Lipkin (1988) in the *American Journal of Clinical Nutrition*. The study examines the role of factors associated with substantial calciuresis. A hypothetical model is proposed involving measures of calcium and potassium in the diet—two highly correlated predictors. Both produce positive coefficients when entered individually, but the sign of diet protein becomes negative when entered simultaneously. The variance inflation factor (VIF) of 4.51 suggests that the collinearity is not considerable (Belsley, 1991). However, when the VIF index is adjusted using model  $R^2$ , the impact appears more substantial than first thought. We propose an alternative diagnostic that utilises the additional influences as a basis to assess the impact of collinearity on the model estimates.

**Conclusions** The results of significance testing for collinear variables within multiple regression should not be the only criteria by which we judge whether collinearity is a problem. The role of collinearity must be carefully assessed and understood using an appropriate index. Measuring the impact of collinearity using overly simplistic diagnostics, such as the VIF, may lure a researcher into a false assurance of the results. Similarly, a model consisting of highly collinear predictors may be relatively unaffected when considered in relation to other factors in the model.

### P66 OPT OUT AS AN ACCEPTABLE METHOD OF OBTAINING CONSENT IN MEDICAL RESEARCH

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**Introduction** A prospective cohort study was set up to investigate a possible association between antibiotic prescribing and antibiotic

resistance of *Escherichia coli* urinary tract infection in the community. A direct link between prescribing and resistance was analysed by searching the records for previous prescription of antibiotics for patients with a suspected urinary tract infection. Participating practices were requested to send a sample from all patients presenting with symptoms of urinary tract infection. Upon receipt of the sample in the laboratory, a letter explaining the study, an opt out form and a freepost envelope were sent to all adult patients. A website with additional information and including an “opt-out” button was set up for the study.

**Results** A total of 1362 urine samples were submitted by the 22 participating practices representing 1178 adult patients. The 22 practices send in between 15 and 115 samples. In total, 193 patients actively responded to the letter: 142 opt-outs by letter, 15 through the website, 2 who opted out by phone and 12 who sent the letter back without indication, making a total of 171 patients or 14.5% opt-out, 22 patients (1.9%) explicitly opted in. Opt out percentages varied from 6.1% to 25.5% by practice. We received 2 expressions of concerns over the opt-out method. A response to the concerns was communicated through their GP practice and no further concerns were expressed. The total group consisted of 941 women (79.9%) and 237 men (20.1%). Their mean age was 50.9 (SD 20.8) and median age was 47. Patients who opted out were slightly older (50.4 vs 52.8) and the percentage of females was slightly higher (79.5 vs 83%) but these differences were not found to be significant. Patients who opted out through the website were significantly younger than those who used the letter (non-parametric, 53.5 vs 38.7). The number of patients with a positive urine sample (identified organism) was 395 (34.2%). Patients with a positive sample were not more likely to opt-out compared to those with a negative sample.

**Conclusions** Overall the opt-out method was well received and participation in the study reached 86.5%. The low number of complaints indicates that this is a generally acceptable method of patient recruitment. The 13.5% opt out shows that it effectively empowers patients to decline participation. The high comparability of the patients opting out with the rest of the patients is reassuring for extrapolation of the results of the study.

### P67 THE ASSOCIATIONS OF SERUM 25-HYDROXY-VITAMIN D AND IONISED CALCIUM WITH LUNG FUNCTION AND ALLERGEN SKIN PRICK TESTS IN ADOLESCENTS AND ADULTS: FINDINGS FROM A CROSS-SECTIONAL STUDY USING THE US THIRD NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES III)

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**Objective** To examine the association of circulating levels of 25-hydroxyvitamin D (25(OH)D) and ionised calcium with lung function and sensitisation to common environmental allergens in adolescents (12–19 years) and adults (20–59 years).

**Design** Cross-sectional study.

**Participants** Participants of the US third National Health and Nutrition Examination Survey (NHANES III), a representative sample of the non-institutionalised US population, with data on serum 25(OH)D levels and spirometry (adolescents, n=2074; adults, n=4647) and 25(OH)D levels and skin prick tests (adolescents, n=1914; adults, n=4782).

**Main Outcome Measure** Forced expiratory volume in 1 s (FEV<sub>1</sub>) and forced vital capacity (FVC) from Spirometry. Skin prick test responses to a standardised allergen panel comprising indoor allergens (house mite; *Dermatophagoides farinae*, cat, German cockroach),