

Commentary on Association of Regional “Non-CHD Cardiac Mortality” with Cropland Mg/Ca Ratio

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ABSTRACT

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Introduction

Regional CHD and “Non-CHD cardiac” death-rates [1] are assessed with respective cropland Mg/Ca ratios [2]. Regional data on cropland Mg and Ca values collected by Rural Centers (RC), which are moderately well overlapping Regions [3], from 1986-90, totaling ca 620,000 samples are from [2]. Region, in Finnish “Maakunta” has the same abbreviation (MK) as RC’s (Maatalouskeskus) [2]. Table 1 shows the names of Regions and their respective Rural Centers

with their Mg/Ca soil equivalent ratios from 1986-90 [(Mg/Ca). (86-90)]. (Mg/Ca) soil values for 17 regions are available as calculated in [3]. (Mg/Ca). Soil of Åland can be obtained by dividing Mg by Ca from [4]. Approximate cropland Mg/Ca ratio for MK01 Uusimaa (0.312) has been obtained by weighting the (Mg/Ca) soil values of Uudenmaan MK (0.338) and Nylands Sv. Lbs. (0.262) from [2,4] by their respective areas of cultivated land (131,453 ha and 70,039 ha) [5].

Table 1: Regions, respective Rural Centers or RC Combinations and (Mg/Ca). (86-90).

Region	Rural Center (or RC Combination)	Mg/Ca (m Eq/L)
MK01 Uusimaa	Combined Uudenmaan MK and Nylands Sv. Lbs.	0.312
MK02 Varsinais-Suomi	Combined Varsinais-Suomen and Finska Hush. Sällskapet	0.26
MK04 Satakunta	Satakunnan MK	0.222
MK06 Pirkanmaa	Pirkanmaan MK	0.227
MK05 Kanta-Häme	Hämeen MK	0.296
MK07 Päijät-Häme	Itä-Hämeen MK	0.203
MK08 Kymenlaakso	Kymenlaakson MK	0.288
MK09 South Karelia	Etelä-Karjalan MK	0.191
MK10 Etelä-Savo	Maaseutukeskus Mikkeli	0.167
MK11 Pohjois-Savo	Kuopion MK	0.234
MK12 North Karelia	Pohjois-Karjalan MK	0.214
MK13 Central Finland	Keski-Suomen MK	0.221
MK14 South Ostrobothnia	Etelä-Pohjanmaan MK	0.258
MK15 Ostrobothnia	Österbottens Sv. LBS.	0.267
MK16 Central Ostrobothnia	Keski-Pohjanmaan MK	0.296
MK17 North Ostrobothnia	Oulun MK	0.333
MK18 Kainuu	Kainuun MK	0.292
MK19 Lapland	Lapin läänin MK	0.339
MK21 Åland	Ahvenanmaa	0.081

For mortality indices have been benefited average mortality ratios CHD/Total for CHD and “Non-CHD Cardiac/Total” (Card.o/Tot) for “Non-CHD Cardiac” of whole population from 1969-2016 obtained by Statistics Finland [6]. The indicator selection has been explained in [1]. Regression of regional average (Card.o/Tot). (69-16) [1] by (Mg/Ca) soil explained its variation by 51.6 % (p = 0.001), with negative association (Figure 1). Respective regional (CHD/Tot). (69-16) regression by cropland (Mg/Ca) explained its

variation weakly positively, non-significantly (by 6.7 %) (Figure 2). Non-significant association was expected by [7], based on data from [8,9]. Positive association is seen especially in North-East Finland with high CHD/Tot and high (Mg/Ca) soil, as well as in Åland with low CHD/Tot and low (Mg/Ca) soil. Distribution of (Mg/Ca) soil values can be dependent on higher Mg-content (opencast) mines, which supply liming agents to the North-East Finland [10].

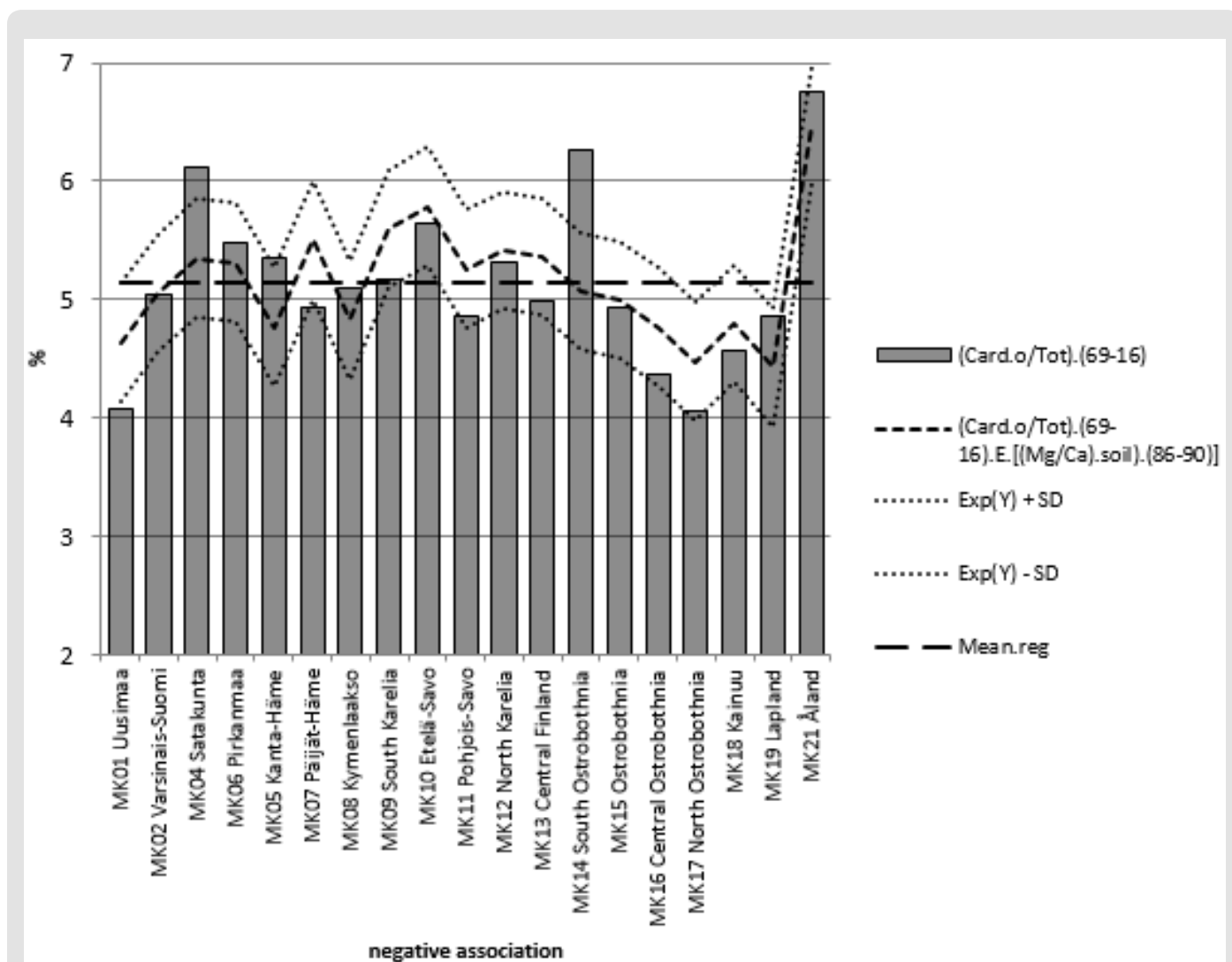


Figure 1: Regional proportional “Non-CHD Cardiac” Mortality in 1969-2016 and its regression by cropland Mg/Ca ratio in 1986-1990.

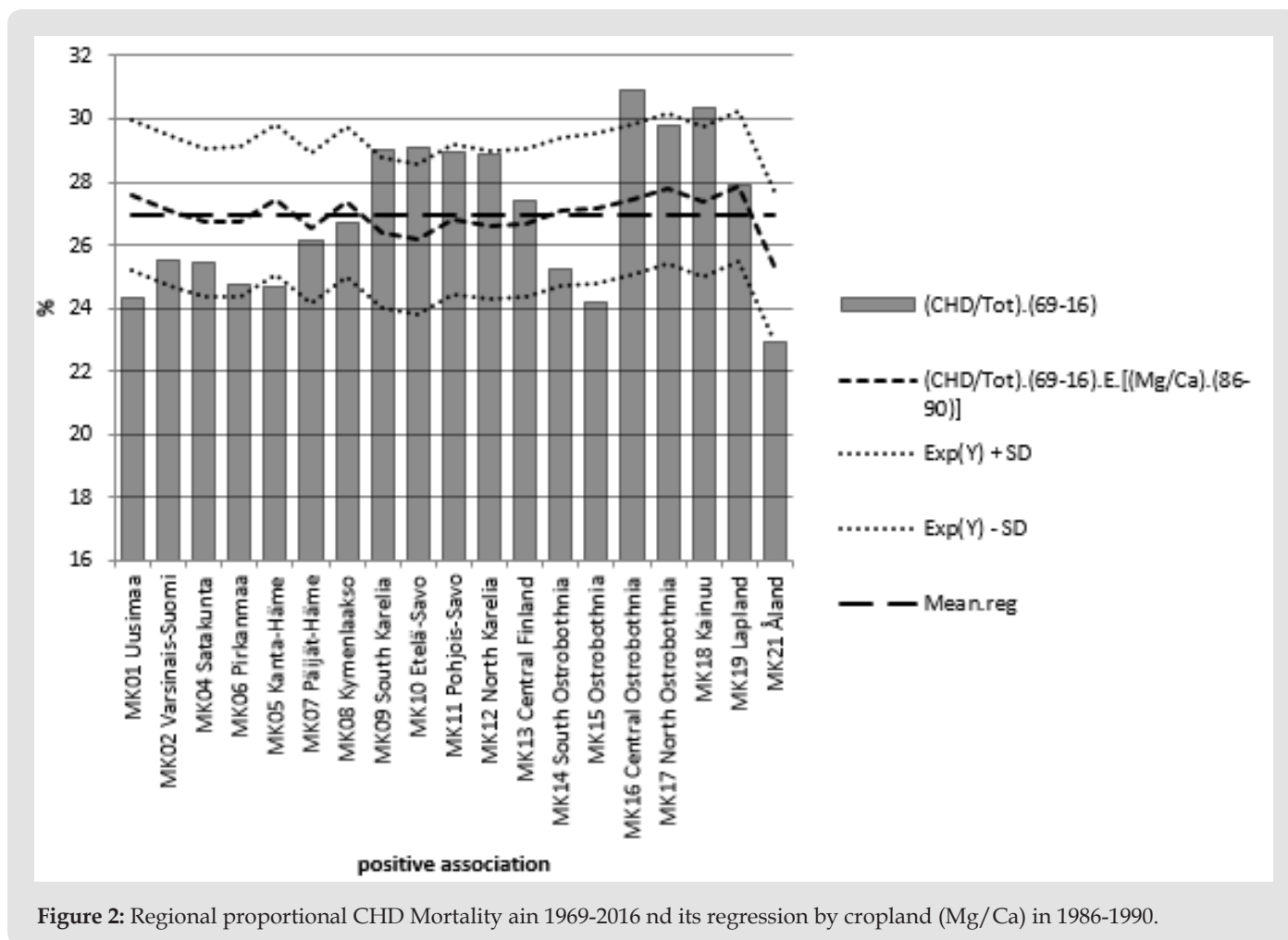


Figure 2: Regional proportional CHD Mortality in 1969-2016 and its regression by cropland (Mg/Ca) in 1986-1990.

By data [1,6] calculated association of cropland (Mg/Ca). (86-90) was higher with (Card.o/Tot). (93-16) (47.5 %, $p = 0.001$) than with (Card.o/Tot). (69-92) (20.3 % ($p = 0.053$)). This could possibly be explained by higher relative changes in fertilization [11,12] before 1986 (by the available data) and in sugar consumption and selenium availability [12]. Lower association with (Card.o/Tot). (93-16) than with Card.o/Tot). (69-16) can be dependent e.g. on statistical variation.

Cropland Mg/Ca ratio can be associated with plant Mg/Ca ratio [7], based on data from [9,13] and could indicate Mg availability. On the other hand (Mg/Ca) soil is an indicator of soil-type [14]- e.g. high in fine mineral soils and low in coarse mineral soils - and can indicate their other soil-type properties, too. Anyhow it seems that Mg can have a stronger regional role in "Non-CHD Cardiac Mortality" than in CHD. (N.B. Arable land area of "Finska Hush. Sällskapet" is including Åland and "continental Finska Hush. Sällskapet" in [5], but soil values are separate for both in [2]. In [2] data of "Pirkanmaan MK" precede data of "Hämeen MK". This order has been maintained in order not to make disorders with my other databases.).

Acknowledgement

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