GRADUATE AND POSTDOCTORAL STUDIES

McGILL UNIVERSITY

FINAL ORAL EXAMINATION
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

OF

KARIM BOUGMA
SCHOOL OF DIETETICS AND HUMAN NUTRITION

EFFECTS OF IODIZED SALT ON CHILD MENTAL AND PHYSICAL DEVELOPMENT IN AMHARA REGION, ETHIOPIA

November 18th, 2016
9:45 am

Macdonald Stewart Building, Room MS2-022
McGill University, Macdonald Campus

COMMITTEE:
Dr. J. Whalen (Pro-Dean) (Department of Natural Resource Sciences)
Dr. T. Johns (Chair) (School of Dietetics and Human Nutrition)
Dr. G. Marquis (Supervisor) (School of Dietetics and Human Nutrition)
Dr. K. Koski (Internal Examiner) (School of Dietetics and Human Nutrition)
Dr. F. Aboud (External Member) (Department of Psychology)
Dr. G. Hickey (External Member) (Department of Natural Resource Sciences)

Dr. Josephine Nalbantoglu, Dean of Graduate and Postdoctoral Studies
Members of the Faculty and Graduate Students
are invited to attend
ABSTRACT
Almost 40% of children under five years of age in low- and middle-income countries do not reach their full developmental potential, and iodine deficiency is among the main risk factors. Universal salt iodization is the recommended strategy to tackle iodine deficiency disorders, but its effectiveness in improving development of young children has not been assessed. We evaluated the effects of iodized salt on the mental and physical development of children under 30 months of age in Ethiopia.

A community-based cluster randomized effectiveness trial was conducted in 60 districts randomly selected out of 75 in the Amhara region of Ethiopia. Thirty districts were randomly allocated to the intervention arm and the remaining thirty to the control arm. In each district, one village was randomly selected. As iodized salt was gradually produced in the nearby Afar region, it was brought early into the markets of the 30 intervention villages before it became widely available and so entered in the 30 control villages through market forces four to six months later. The primary outcome was the mental development (cognitive, language, and fine motor) scores of infants on the Bayley Scales and the anthropometric standardized scores. Other outcomes included psychosocial stimulation and maternal depressive symptoms. Analysis was intention-to-treat using mixed linear models adjusted for covariates and clusters. The trial was registered at ClinicalTrials.gov, NCT013496.

We recruited exhaustively and assessed 1835 infants 5 – 11 mo at baseline between October 2011 and April 2012 in 60 villages. The same children (85% of the baseline sample) were re-assessed between March and October 2013 when they were 20 to 29 mo of age. At this point all villages had iodized salt. At endline, urinary iodine concentration was significantly higher in intervention compared to control children (median 228.0 vs 155.1 µg/L, respectively), presumably due to their longer exposure to higher quality iodized salt. The intervention group had significantly higher scores than controls on three of the four Bayley subscales: cognitive (53.27 vs 52.54; d = 0.13, 95% CI 0.03,0.23), receptive language (20.71 vs 20.18, d = 0.13, 95% CI 0.03,0.24), fine motor (35.45 vs
34.94, d = 0.15, 95% CI 0.04,0.25) as well as on the standardized Bayley composite score (130.60 vs 128.51; d = 0.13, 95% CI 0.02,0.23). Intervention mothers also had significantly fewer depressive symptoms (16.12 vs 17.74; d = 0.16, 95% CI 0.06, 0.27).

Regarding physical growth, there was no significant effect of the intervention, but significant interactions were found indicating modifier effects of early access to iodized salt. Children from families with more assets and better water and sanitation facilities in the intervention group had better nutritional status on height-for-age z-score and MUAC-for-age z-score. These findings are discussed in terms of critical issues in this field such as the timing of iodine exposure and the format of iodine delivery, namely iodized oil capsules vs iodized salt.

Implications for policy from the current findings are (a) the need to support children’s iodine status and mental development, (b) the importance of monitoring the salt quality but prioritizing access for the majority of the population over iodization quality, and (c) enacting and maintaining the mandatory legislation to sustain universal iodization.
CURRICULUM VITAE

UNIVERSITY EDUCATION
Ph.D. candidate (Human Nutrition). McGill University, QC, Canada. Sept 2010 – Present
B.Sc. in Human Nutrition and Food Technology. University of Ouagadougou, Burkina Faso in collaboration with Wageningen Agricultural University, Netherlands Oct 1995 – Sept 1999

EMPLOYMENT
AWARDS
Graduate Student Research Award, American Society for Nutrition, Experimental Biology, Boston, MA, USA (April 2015)
Micronutrient Global Conference, Presenter travel award (June 2014)
Graduate Research Enhancement and Travel Award (March 2014)
Graduate Research Enhancement and Travel Award (Feb 2014)
Graduate Students Excellence Award in Dietetics & Human Nutrition (Sept 2013 – Aug 2014)

PROFESSIONAL SERVICES
Peer review for Nutrients journal (2016)

MPH thesis supervision (April 2013 – April 2015)
Prevalence and associated factors of malnutrition in children under five years old in East Gojjam zone, Amhara Region, Ethiopia
Submitted by Agernesh Alem
To University of Debremarkos and Gamby College of Medical Sciences, Ethiopia

PUBLICATIONS


PRESENTATIONS


Bougma K, Marquis GS, Aboud FE, Frongillo EA, Singla D, Harding KB, Lemma T, Samuel A, Zerfu D. Iodine Deficiency and Child Development


