Assessment of health and potential for milk based intervention to improve the nutrient intake of toddlers in New Zealand

Nutrition remains a key determinant of child health globally.¹ Childhood malnutrition, both macronutrient over-nutrition and micronutrient under-nutrition is prevalent in New Zealand (NZ).² NZ has a large burden from communicable diseases for which, in the developing world, malnutrition is known to play a causal role.¹-³ Deficiencies in iron and iodine, micronutrients that play central roles in brain development, cognition and learning, are prevalent in NZ during infancy.⁴ ⁵ Community based nutrition interventions have been used successfully in developing and developed countries to prevent and treat micronutrient deficiencies.⁶ ⁷ Such interventions have also been shown to prevent the adverse health effects that result from micronutrient deficiency.⁶ ⁷ We recently examined the health of young children living in a socio-economically deprived urban region and completed the piloting necessary for a subsequent trial of a milk-based nutritional intervention.

Methods—Thirty-eight children aged 9 to 18 months (mean age 15 months) who were enrolled with the Tamaki Primary Health Care Organisation in Auckland, NZ were recruited between July and October 2008. Data were collected at face-to-face study enrolment and completion interviews with each child’s caregiver, at weekly telephone caregiver interviews, by abstraction of data from health care records and by assessment of the child’s growth, development and middle ear function. Data collected included demographics, dietary intake (food frequency questionnaire), middle ear function (tympanometry), development (Bayley Scales of Infant Development III),⁸ communicable disease episodes and health care utilisation (parental report and primary care record review). Ethical approval was obtained from the Northern Y Regional Health & Disability Ethics Committee.

The children were randomised to receive either a micronutrient-fortified fresh milk (N=17) or powdered formula (N=19) based intervention. The fresh milk product was Meadowfresh Junior (Goodman Fielder). The formula product was Karicare toddler (Nutricia, New Zealand). Each 500 ml of the fresh milk product provided approximately 50% of the recommended daily intake of iron, zinc, iodine and vitamin D. Each 500 ml of the powdered milk formula contained 25 to 50% of the recommended daily intake of 16 vitamins and minerals. Both milk interventions were provided for three months.

Data analyses were undertaken using the JMP v5.1 software (SAS Inc. NC, USA). Differences in proportions of categorical variables were investigated by the Fisher’s exact test.
**Results**—Sixteen (44%) of children were male. The boys had a mean height of 81cm (+1 SD height-for-age relative to WHO reference population) and a mean weight of 11.9 kg (+1.4 SD weight-for-age). The girls had a mean height of 82cm (+1.7 SD height-for-age) and a mean weight of 11kg (+1 SD weight-for-age). The enrolled sample was ethnically diverse (28% Māori, 28% Pacific, 22% Asian, 17% NZ European and 6% of other ethnicities). Children were followed for a median of 78 (48-97) days.

Three-quarters (72%, 26/34) of the children had abnormal tympanograms for one or both ears with abnormalities persisting up to 20 weeks. Fifteen children (44%) with persistently abnormal tympanometry were referred to the paediatric otorhinolaryngology clinic. All children had developmental testing completed. Bayley Scale III mean cognitive and language scores were one standard deviation below the reference population mean. The mean motor and socio-emotional scores approximated the reference population mean.

At weekly interviews, coughing was reported in 23 (64%) of the children, wheezing in 15 (42%), cold or flu symptoms in 25 (69%), sneezing or rhinorrhoea in 32 (89%), snoring in 20 (56%), ear infection in 9 (25%) and gastrointestinal symptoms in 16 (44%). The children experienced a mean of 3.4 days/month of coughing, 1.2 days/month of wheezing and 1.2 days/month of gastrointestinal symptoms. The children made between 0 and 42 primary health care visits. Forty-seven percent had made 11 or more visits since birth. Almost two thirds (65%) of visits were for respiratory illnesses including otitis media.

Twenty-two (61%) of the children consumed an average of 500 to 600mls/day and parents reported that both milk interventions were acceptable. The milk volume consumed did not differ between the 2 groups. Intake of other nutritious foods from the major food groups as recorded in food frequency questionnaires did not decrease over the interval that the children received the milk intervention.

**Discussion**—This pilot study highlights the poor health status of young NZ children living in a socio-economically deprived urban region. These data suggest concerning rates of middle ear disease, respiratory symptoms, high primary health care usage and poor developmental assessment results. There is a paucity of contemporary data on the health of children in NZ from a primary care perspective. Our study shows the largest symptom and disease burden in our children was from respiratory illnesses.

Both fortified fresh and powdered formula milk were acceptable to the mothers and consumed in sufficient quantity to provide 25 to 50% of recommended micronutrient intakes. The provision of this milk did not reduce the consumption of other nutritious foods.

In order to improve child health, New Zealand needs to consider developing policy that helps to secure a nutritious diet for young children. The findings from this pilot study indicate that micronutrient fortified milk is a potentially important component of such a diet.

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References: