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<th>Title</th>
<th>Many School Lunches Deficient in Nutrients</th>
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A survey of 500 Dublin schoolchildren in the 9-to-12-year-old age group showed that about 4% of them missed breakfast and about 80% ate lunch at school. The results showed that only a small percentage of children attained the recommended lunch allowance (RLA) for the individual nutrients. The mean energy intake was about 58% of the RLA for the whole sample, protein intake about 57%, iron 47%, calcium 75% and vitamin C 93%.

Children at urban corporation schools generally had lower intakes of nutrients than children from the other types of school. They also had a less varied diet at school than children from urban non-corporation and rural schools; a higher percentage of the latter consumed fruit, butter, biscuits, cake, potato crisps and soft drinks. Although milk was freely available at urban corporation schools at the time of the survey only 47% of children at these schools actually consumed it.

Cereal-based foods, dairy products and confectionery (including potato crisps), supplied 31, 23 and 22% of the energy for children who lunched at school.

Fruit and salad consumption was small. About 59% of children ate white bread and buns, and only 6% ate brown bread. Many children consumed nothing at school except biscuits, crisps, soft drinks and sweets.

This article outlines the results of the survey and discusses the implications for the health and nutrition of the children.

**Many School Lunches Deficient in Nutrients**

Bernadette McLaughlin, T. R. Gormley and Claire Wickham

Most children now consume a lunch at school; the lunch may be supplied through the school itself, it may be prepared in the home and sent with the child, and/or the child may purchase food in a shop adjacent to the school. Whatever the source, the nutritional quality of the lunch is important as the child requires a good level of nutrition during school hours in order to maintain concentration and learn efficiently. It is recommended that lunch (RLA = recommended lunch allowance) should provide one-third of the daily requirement of nutrients as outlined in the recommended daily allowance (RDA).

It was decided, therefore, to carry out a survey to find out what kind of foods — and how much — were being eaten by children at school in the Dublin area. This includes the lunch sent from home with the child and other items that the child purchases at, or on the way to, school.

**Different types of school**

A random sample of 25 primary schools in Dublin city and county was selected. The sample was divided into three categories, i.e., 12 urban corporation schools where children were supplied with milk and buns or sandwiches by Dublin Corporation; 11 urban non-corporation and 2 rural schools where children brought or bought their own lunch. Over 500 pupils in the 9-to-12 age group were interviewed once in the period October-December 1980 and again in the period February-April 1981. Their dietary habits in relation to food consumed at school (i.e., lunch and other snacks) were recorded and the intake and range of foods quantified in as far as possible by dietary recall and food models.

Obviously, accurate quantification of the amount of food eaten and conversion of these findings to actual intakes of protein, carbohydrates, fats, vitamins and minerals is difficult and the results must be interpreted by the reader as approximations rather than as absolute values. However, bearing these difficulties and limitations in mind, useful information on average values and trends can be obtained. It is important to note that the study was carried out prior to the introduction of the EEC milk scheme. Presumably this scheme will have improved the lunchtime nutritional status of many children over-and-above the level found in this survey.
Children who stayed in school for lunch had a mean energy intake of about 58% of the RLA. Only 10% attained the RLA for energy.

**Most ate breakfast and lunched at school**

The results showed that about 4% of the children missed breakfast. Girls had a greater tendency to miss breakfast than boys except in the rural schools. The urban non-corporation schools were best in relation to consuming breakfast and the urban corporation schools worst.

About 80% of children ate lunch at school. A much higher percentage of girls ate lunch at school than boys. As would be expected a higher proportion of the children from rural schools ate lunch at school.

It is important to note that children who went home for lunch also consumed a considerable amount of food at school — presumably during their play breaks. This is clearly shown (Table 1) where children going home for lunch consumed almost half the amount of calories at school as those staying in school for lunch. In addition, the relative proportions of carbohydrates to protein or fat by weight were fairly similar for the two groups.

About 32% of children bought part, or all, of their lunch in addition to that which they brought from home. More children at urban corporation schools bought part of their lunch than did children from the other school types.

Children who had no breakfast were more likely to purchase part of their lunch (43%) than those who had breakfast (32%).

**Low intakes of energy**

Children in the sample who stayed in school for lunch had a mean energy intake of about 58% of the RLA (Table 2). Girls had a higher energy intake than boys. Pupils attending urban corporation schools had a much lower energy intake (49%) than the other two groups.

Overall, only 10% of children attained the RLA for energy with urban corporation schools having the lowest number. Variation in energy intake between children was also greatest for children in urban corporation schools, indicating a very low to zero energy intake for some and a relatively high intake for others.

Percentages of energy coming from protein, carbohydrate and fat were 50, 10 and 40 respectively.

**Too much energy from fat**

Ingestion of the three groups of nutrients was lower for the urban corporation schools than for the other two school types. Children in the rural schools had a considerably higher protein intake on a per gram basis while the urban non-corporation children consumed the largest amount of carbohydrate.

**Low consumption of iron**

The mean intake of iron was about half the RLA (Table 2) while only about 5% of children actually exceeded the RLA. The intake for boys and girls was similar while children at urban corporation schools had a lower intake than children in the other school types.

In contrast, children at urban corporation schools had the highest

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**TABLE 1: Intake of energy, carbohydrates, protein, fat, iron, calcium and vitamins from food consumed at school compared with the recommended lunch allowance**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Children staying in school for lunch</th>
<th>Children going home for lunch</th>
<th>Recommended lunch allowance</th>
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</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>415</td>
<td>187</td>
<td>760</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>55.2</td>
<td>23.7</td>
<td>683</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>10.25</td>
<td>5.0</td>
<td>19</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>18.6</td>
<td>8.7</td>
<td>17</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>1.88</td>
<td>0.79</td>
<td>4</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>174</td>
<td>115</td>
<td>233</td>
</tr>
<tr>
<td>Vitamin A (µg)</td>
<td>98</td>
<td>34</td>
<td>192</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>7.4</td>
<td>3.5</td>
<td>8</td>
</tr>
<tr>
<td>Thiamine (mg)</td>
<td>0.29</td>
<td>0.09</td>
<td>0.3</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>0.21</td>
<td>0.15</td>
<td>0.4</td>
</tr>
<tr>
<td>Niacinamide acid (mg)</td>
<td>2.0</td>
<td>0.76</td>
<td>4.7</td>
</tr>
</tbody>
</table>

It is generally recommended that at least 50% of energy intake should come from carbohydrates, not more than 35% from fat and about 15% from protein. The mean results from this survey (Table 3) show that more than the recommended amount of fat was being consumed in the lunch whereas energy from protein was considerably below the recommended level at about 10%. The carbohydrate contribution to total energy intake was close to the recommended level.

Protein intake was below the RLA level especially at urban corporation schools. Overall, only about 12% of children attained the RLA for protein.
calcium intake (83% of RLA approximately) with about 40% of children actually attaining the RLA for calcium. This is due to the milk scheme which operated (and still does) at these schools. Presumably the introduction of the EEC milk scheme at the other schools since the time of the survey will have raised the calcium status of the children attending these schools as well.

Intake of Vitamins A and C

Overall, Vitamin A intake was about 52% of the RLA (Table 2). Children at urban corporation schools had a much lower Vitamin A intake than children in the other school types; this can be attributed to their much lower butter consumption.

While, overall, Vitamin C intake was in excess of 90% of the RLA only about 15% of children actually attained the RLA. This was due to the fact that a small number of children had exceptionally high intakes and also a large number of children had intakes very close to, but just below, the RLA value. Children at urban non-corporation schools had a much higher intake than children at the other school types due to a higher consumption of fruits, butter, biscuits, cake, potato crisps and soft drinks.

Thiamine, niacin and nicotinic acid

Thiamine intake was in accordance with the RLA. Riboflavin intake was about 50% of the RLA, with boys having a much higher intake than girls; this is probably due to their higher consumption of milk and corned beef.

Intake of nicotinic acid was about 43% of the RLA and 8% of children attained the RLA. Urban corporation school children had the lowest intake and also the largest variation in intake.

Which foods children eat

In general, children from urban non-corporation and rural schools had a more varied diet at school than urban corporation school children and a higher percentage of them consumed fruit, butter, biscuits, cake, potato crisps and soft drinks.

The percentage of children consuming bread at rural schools was higher than that in the other schools while urban corporation schools had the highest proportion of children consuming milk; this was due to the Dublin Corporation milk scheme. However, only 47% of the children at these schools consumed milk despite the fact that it was freely available.

Only a small percentage of children at urban corporation schools consumed orange drink and carbonated soft drinks, presumably because of the availability of milk, but over 30% of children in urban non-corporation schools consumed these drinks. Presumably the EEC milk scheme will change this situation to some extent in urban non-corporation and rural schools. Bread (+ buns) was consumed by 62% of urban corporation school children. Overall, 59% of children consumed white bread + buns and only 6% brown bread.

As expected, a considerable proportion of the children consumed chocolates, sweets, crisps, preserves and soft drinks while very small numbers consumed items such as tomatoes, yogurt, hard boiled eggs and salad type lunches. Practically all of those consuming tea or coffee took sugar.

Quite a wide range of food items are consumed at school by children who go home for lunch and a high proportion of these children consume bread, chocolates, crisps, milk and sweets. Most of the bread (+ buns) and milk were eaten by children at the urban corporation schools who were presumably availing of the supplies of these items in addition to going home for lunch.

TABLE 3: Percentage of energy* from carbohydrate, protein and fat from food consumed at school

<table>
<thead>
<tr>
<th></th>
<th>Urban corporation</th>
<th>Urban non-corporation</th>
<th>Rural</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbohydrate</td>
<td>48</td>
<td>51.5</td>
<td>50.5</td>
<td>50</td>
</tr>
<tr>
<td>Protein</td>
<td>10.5</td>
<td>8.5</td>
<td>10.5</td>
<td>9.5</td>
</tr>
<tr>
<td>Fat</td>
<td>41.5</td>
<td>40</td>
<td>39</td>
<td>40.5</td>
</tr>
</tbody>
</table>

*Children not going home for lunch

Points to note

1. The study was based on food consumed by the children at school and the results may, or may not, reflect their true nutritional status.
2. It is desirable that children have a reasonable level of food intake at school to enable them to concentrate and learn efficiently.
3. The study was based on a small number of schools, i.e., 25 in Dublin county using children in the 9-12 age group, and the results may not reflect the overall position in County Dublin or in the rest of the country.
4. The results are based on two interviews with each child, one in the period October-December 1980, and the other in February-April 1981.
5. The quantitative data given for food intake were not obtained by weighing the food in question in most cases but by using food models and measures to aid recall.
6. The study was carried out prior to the introduction of the EEC milk scheme.
Sources of energy
Cereal-based foods, dairy products and confectionery (+ potato crisps) were the main sources of energy for children who did not go home for lunch with values of 31, 23 and 22%, respectively. In children that did go home for lunch the order was partly reversed, i.e., confectionery (+ potato crisps) 36%, cereal-based foods 20% and dairy products 15%. These data suggest that children who go home for lunch tend to eat a greater proportion of the "less beneficial type of foods" at school than do children who do not go home for lunch. The proportion of energy coming from fruit and vegetables was considerably less than that from the other food types but it must be pointed out that fruit and vegetables are relatively low calorie items.

Implications of study
The fact that only a small percentage of children attained the RLA values for the individual nutrients indicates the possibility of nutrient deficiencies and suggests that the Department of Health and Social Welfare should review the school lunch area and issue recommendations as to the quantity and range of foods required to attain, or at least approach, the RLA target values. However, children may not eat the food, even if they are supplied with it. This is clearly seen from the results of this study where only 45-50% of children at urban corporation schools drank the milk supplied. Arising from this it would be interesting to survey the percentage of children who actually drink the milk supplied under the recently introduced EEC school milk scheme. The question also arises as to how the school lunch pattern and quality reflects overall consumption patterns.

On the basis of school type, the children at urban corporation schools generally had lower intakes of nutrients than children from the other types of school with the exception of calcium, thiamine and riboflavin; the higher levels of these nutrients were due to the consumption of milk and oxtail soup by children at the urban corporation schools.

The full text of this survey was published as Technical Bulletin No. 6, in the Home Food Science Information series by An Foras Taluntais, and can be obtained from Kinsealy Research Centre, Dublin 5.

Many children consumed nothing for their lunch except biscuits, crisps, soft drinks, sweets or chocolate. Better balanced lunches are required.

Fruit and salad consumption was generally small and could be greatly increased by promotion and by suggesting that every child should have at least one fruit or vegetable item in his/her lunch each day. There was a large disparity between the consumption of brown and white bread. Every effort should be made to promote brown bread even if it meets with 'child consumer resistance'. This problem, and many others associated with the consumption of nutritious foods by children, could be solved through better nutritional education of children at school from an early age.

As would be expected the number of children consuming biscuits, crisps, soft drinks, chocolates and sweets was high. It is recognised that all children like these items. However, interviews with the children showed that many of them were consuming nothing else but these items, i.e. there was no element of balance in their school diet. It was also apparent that almost all children taking tea or coffee used sugar. The consumption of some dairy products, notably yoghurt, was exceptionally low, while the intake of other convenience items such as cheese and sliced meats was also on the low side.

The school years provide an ideal opportunity for the development of healthy eating habits in young people. Most health-related unconscious learning and attitude formation occur before a child reaches 10 years of age. However, attitudes and habits remain susceptible to change for a few years after this. It is clear from this study that this aspect of development is being neglected.

Recommendations
1. Develop school food policies aimed at restricting the amount of "junk-type" food available to children during the school day.
2. Improve the status of the lunches being eaten at school by children through the issuing of a range of sample lunches by pamphlet which will enable children's intake to attain or approach the RLA values for nutrients. This could be brought about through the Department of Health and Social Welfare/Health Education Bureau.
3. Educate children from an early age, and also their parents, as to the importance of a balanced diet, and of the necessity for balancing the intake of sweets, chocolate, crisps etc. with brown bread, fruit, meat and dairy products.
4. Create a greater awareness at Health Board and school level as to the importance of the school lunch.
5. Carry out further surveys to confirm and broaden the findings of this study in other parts of the country.