

# **Caries Frequency and Nutrition Before, During and After World War II.**

By

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## **Basis for Present Study.**

This investigation was undertaken in the parishes of Gjerpen and Siljan, two country municipalities east of the Skiensfjord in The county of Telemark.

The parish of Gjerpen numbers approximately 12,000 inhabitants. The following trades are represented: about 1,850 adults are employed in agriculture and forestry, about 50 are lumberers exclusively, and about 4,000 are industrial labourers and functionaries.<sup>1</sup>

Only about 30 per cent of the population, then, are found to be food growers, whereas the others have to buy their food and find themselves, in this respect, in the same situation as an urban population. The most prolific families, however, are to be found among the population of industrial labourers, and owing to this fact the above-mentioned percental distribution based on the trade of the father, is not met with in the schools. Among the school-children, therefore, children from districts of an urban character are numerically predominant.

The parish of Siljan numbers about 1,400 inhabitants, nearly all of whom are employed in agriculture and/or forestry.

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<sup>1</sup> According to information given by the municipal office of Gjerpen.

The school-children of Gjerpen have been treated annually since the school-year 1937—38, those of Siljan since 1942—1943. Each child has been examined with an interval of one year, and deviations of more than one month from this rule have been rare. Practically all the school-children have been attended to.

Since 1943—1944 also children below school-age in Gjerpen have received treatment. About 60 per cent of this category appeared for treatment.

### Statistics Relating to Dental Caries.

The statistics comprise the permanent teeth of the school-children of Gjerpen and Siljan. The number of children comprised by the statistics is recorded in table I.

**Table 1.**  
*Number of school-children.*

	Gjerpen	Siljan
1938—39.....	1,071	
1939—40.....	1,036	
1940—41.....	954	
1941—42.....	922	
1942—43.....	906	153
1943—44.....	847	149
1944—45.....	859	151
1945—46.....	870	139
1946—47.....	896	137
1947—48.....	884	129

The average percentage of carious permanent teeth and of carious tooth surfaces from the last pre-war year to the school year 1947—1948 may be seen in figure 1 and figure 2.

The average percentage of caries has been calculated by the following formula:

$$G = \frac{\sum \frac{c}{t}}{k}$$

c denoting number of carious teeth, t number of teeth, and k number of "years". That is, the percentage for each "year" is calculated, the resultant figures are added up, and the sum is divided by the number of "years" — 7. This mode of calculation has been chosen in order to eliminate a possible influence of the

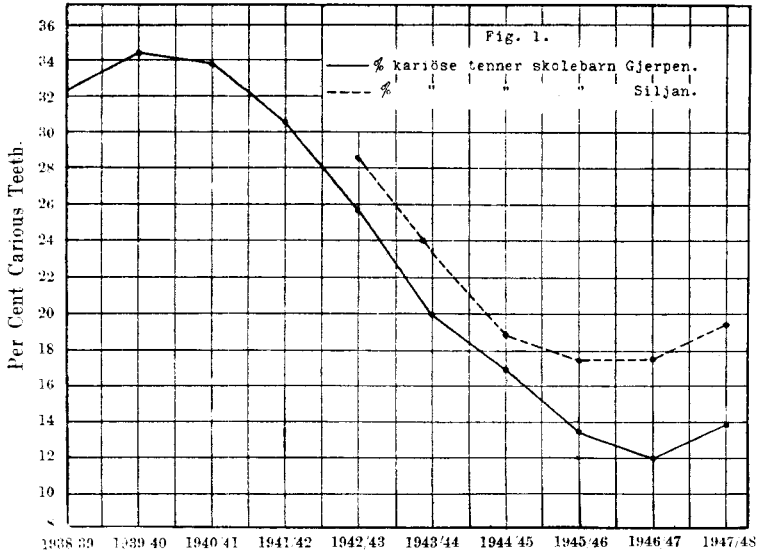


Figure 1.  
Percentage of carious teeth in school-children Gjerpen.  
Siljan.

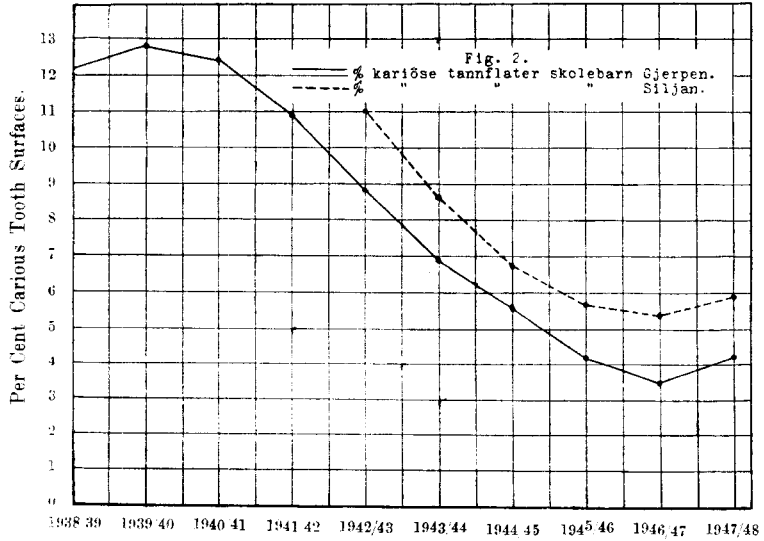


Figure 2.  
Per cent carious tooth surfaces school-children Gjerpen.  
Siljan.

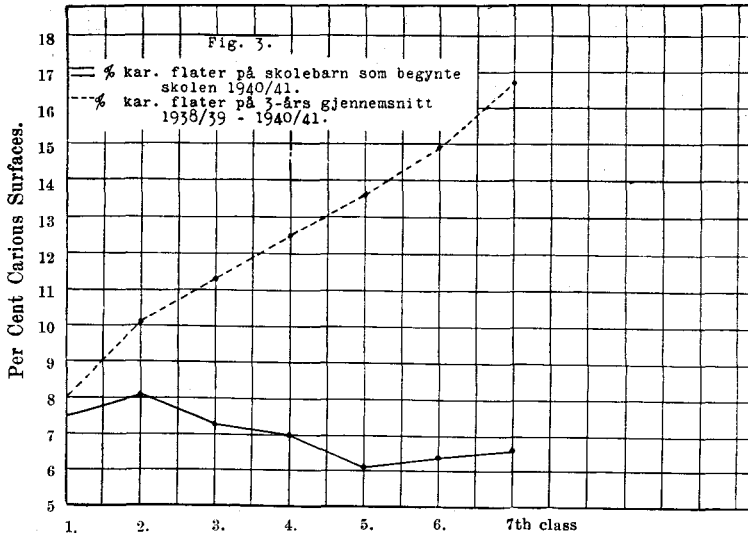


Figure 3.

————— Per cent carious surfaces in children entering school 1940/41.  
 - - - - - » » » » » on a three years' average 1938/39—1940/41.

variation in numbers of children. I may, if desired, be expressed thus: a typical representative of each year is taken, and the average of these seven is calculated.

As a carious surface is regarded every surface with filling, carious defect, or obvious decalcification. Even prophylactic fillings are counted fillings. Every decalcification that has been polished or treated in any other way, but not filled, has continuously been considered carious, even if no new decalcification has appeared on the surface in question. Removed teeth are counted as having three carious surfaces, those teeth excepted which have been removed on orthodontic indication.

It appears from figure 1 and figure 2 that the school-children of Siljan have a higher percentage of dental caries than those of Gjerpen. To some extent this may be explained by the fact that the children in Siljan are examined about half a year later than those in Gjerpen, the percentage of dental caries being on the rise with rising age before the war. This may be seen in figure 3.

The graph drawn in with a broken line shows the increase in the percentage of caries in the school-children during the last pre-war year and the first two years of the war. The lined graph in

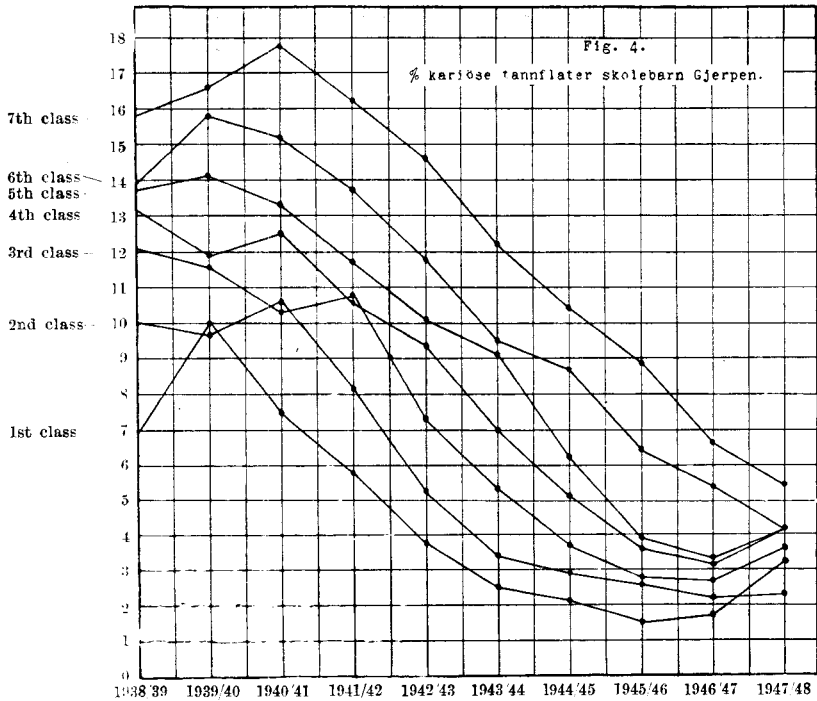


Figure 4.  
Percentage of carious surfaces in school-children in Gjerpen.

figure 3 illustrates the caries activity in the children who entered school in the first year of the war. It will be observed that this graph is horisontal, partly descending.

The fact that the children of Siljan are examined later does not condition a higher percentage of dental caries in them. That, in fact, they have a higher percentage must therefore be due to other causes. This matter will be dealt with later on.

In figure 4 the graph of caries for Gjerpen represented in figure 2 has been divided into separate graphs, one for each year.

It is observed that the decrease is rather homogeneous for each of the seven "years". In the lower classes there are some irregularities, during the earlier years of the war especially. They are chiefly due, no doubt, to the fact that individual variations make themselves felt owing to the comparatively small statistical mass (cf. table 1), every carious surface thus carrying greater weight relatively than in the higher classes with a larger

number of teeth. It is a striking fact, however, that the percentage of caries in the sixth and seventh classes is still on a decline during the school year 1947—1948, when in all the other classes it is on the rise.

In an effort to characterize the decrease in the caries incidence with greater exactitude I have made up table 2, which illustrates how, during the war, there has been a change in the onset of caries on various teeth, such as the situation was for the pupils of the seventh class when they left school. The teeth are divided into five categories: second molar, first molar, premolars, canines, incisors.

**Table 2.**  
*Incidence of caries onset in categories of teeth.*

7th class	Number of carious teeth per 100 children of				
	second molar	first molar	premolar	canine	incisors
1938—1939.....	237	373	203	51	319
1939—1940.....	278	364	173	33	334
1940—1941.....	263	375	199	52	338
1941—1942.....	244	379	175	25	346
1942—1943.....	172	364	152	19	301
1943—1944.....	104	369	103	16	279
1944—1945.....	118	365	62	4	249
1945—1946.....	58	328	42	6	213
1946—1947.....	71	319	28	6	144
1947—1948.....	75	297	36	4	129

Table 2 records a comparatively even decrease of caries activity throughout the war in the case of all categories of teeth, except the six years' molar. The incidence in the case of the six years' molar shows no decrease until 1945—1946. Formerly more than 90 per cent of them were carious, when during the recent three years there is a decrease to 82, 79.8, and 74.2 per cent respectively. It may be expressed thus: in 1945 the change for the better had advanced so far that even the six years' molar began to go clear of the onset of caries. The increase of caries activity after the war does not appear on this point except in the case of the second molar, the seventh class, as mentioned above (cf. figure 4) still showing a decrease in its percentage of caries.

In table 3 may be seen the incidence of dental caries in the different tooth surfaces. The surfaces are divided into three categories: fissure surfaces, proximal surfaces, and free, smooth surfaces.

**Table 3.**  
*Incidence of caries in tooth surfaces.*

7th class	Percental distribution of caries surfaces among		
	fissure surfaces	proximal surfaces	free, smooth surfaces
1938—1939.....	37.9	49.0	13.1
1939—1940.....	39.5	46.9	13.6
1940—1941.....	37.9	48.8	13.3
1941—1942.....	39.3	47.2	13.5
1942—1943.....	38.4	47.8	13.8
1943—1944.....	37.9	47.4	14.7
1944—1945.....	41.9	42.2	15.9
1945—1946.....	40.1	43.2	16.7
1946—1947.....	46.9	36.3	16.8
1947—1948.....	47.7	35.6	16.7

Table 3 reveals the peculiar fact that there was no change worth mention in the incidence of caries in the different surfaces till in 1944—1945. Then there was a rise in the relative number of carious-free, smooth surfaces and of fissure surfaces. The number of the carious free smooth surfaces being very small, it influences the total percentage of caries only in an inconsiderable measure. Altogether there were during the last four years 195, 182, 117, and 130 respectively per 100 children. But the table records a considerable reduction in the incidence of caries in the case of the proximal surfaces during the recent four years. Per 100 children there is a decrease from 528 to 500 and 251, with a small rise during the recent year to 270.

**Table 4.**  
*Dental caries activity in each carious tooth.*

7th class	Number of carious surfaces in each carious tooth
1938—1939.....	1.88
1939—1940.....	1.71
1940—1941.....	1.83
1941—1942.....	1.87
1942—1943.....	1.76
1943—1944.....	1.73
1944—1945.....	1.62
1945—1946.....	1.73
1946—1947.....	1.54
1947—1948.....	1.43

The reduction in dental caries activity did not appear, however, in a decrease in the number of carious teeth and surfaces only, but even in a decreased caries activity in each carious tooth. This may be seen in table 4.

**Table 5.**  
*Children in the 7th class with caries free permanent teeth.*

7th class	Number of children	Number of children with carious-free permanent teeth	
		with carious temporary teeth	with caries free temporary teeth
1938—1939.....	120	0	2
1939—1940.....	161	0	1
1940—1941.....	150	0	1
1941—1942.....	132	0	0
1942—1943.....	162	2	0
1943—1944.....	127	0	1
1944—1945.....	123	1	2
1945—1946.....	131	7	0
1946—1947.....	114	7	0
1947—1948.....	118	18	1

For completeness' sake a survey is given of the number of caries-free children among the school-children of Gjerpen. Table 5 shows the number of children in the seventh class with caries-free permanent teeth during the last ten years. They are divided into two categories: those with and those without carious permanent teeth.

It will be observed that still only a small minority of the children have perfectly sound teeth when they leave school, and among the seven who were caries-free in 1945—1946 there were two diabetics and in 1946—1947 three diabetics, whereas there were none in 1947—48. Diabetic children, however, are in an exceptional position on account of their diet which is poor in carbohydrates (TOVERUD, 35). Nevertheless, that there were that many caries-free children during these last three years tells favourably of the reduction of caries activity during the war.

In table 6 is seen the number of children with caries-free permanent teeth among those who are attending school now.

The fact is worth noting that there are that many children perfectly free of dental caries in the first and second classes, 15.7 per cent and 13.6 per cent respectively, whereas the large number of children with caries-free permanent teeth but with carious

**Table 6.**  
*Present-day school-children with caries free permanent teeth.*

Class	Number of children	Number of children with caries free perm. teeth	
		with carious temporary teeth	with caries free temporary teeth
1st class .....	127	57	20
2nd class .....	147	73	20
3rd class .....	154	69	8
4th class .....	131	47	3
5th class .....	103	38	0
6th class .....	104	21	0
7th class .....	118	18	1
Total	884	323	52

milk teeth in the lower classes is of no consequence. On the whole, the milk teeth of these children are bad and as yet they have few permanent teeth, usually twelve at the highest.

As may be seen from these graphs and tables there has been a most striking decrease in the incidence of dental caries during the war. Before the war about one third of the teeth affected as against one ninth at present. A slight increase in the percentage of caries 1938/39—1939/40 is due, doubtlessly, to the fact that only from that year I could find the time to insert prophylactic fillings in the twelve years molars, these surfaces thus being counted carious one or two years earlier than they would otherwise have been. I then presume that practically all these teeth would in the course of these years have become carious. During the latter years of the war the number of prophylactic fillings in the twelve years molars was very much reduced.

At present, after the war, the incidence of dental caries is on the rise again, as is apparent from figure 1 and 2. An attempt has been made to find the time of reversal by means of the following argumentation: The parish of Gjerpen is divided into two parts: Uthaugen and Ophaugen. The school-children at Uthaugen are examined in autumn, those at Ophaugen in winter and spring. Up to the year 1946—1947 the children of Uthaugen showed a somewhat higher caries incidence than those of Ophaugen in all the seven classes. In 1946—1947 a change took place to the effect that the average percentage of dental caries at Ophaugen surpassed that at Uthaugen, as may be seen in table 7.

**Table 7.**  
*Percentage of caries activity in school-children from the two districts of Gjerpen.*

Class	Percentage of carious permanent teeth 1946/47	
	Uthaugen	Ophaugen
1st class .....	3.5	8.9
2nd class .....	6.7	9.6
3rd class .....	9.1	11.1
4th class .....	11.6	10.6
5th class .....	14.4	13.8
6th class .....	13.5	15.0
7th class .....	20.1	18.9
Average .....	11.3	12.6

Table 7 shows that this change took place in the three lower classes and in the sixth class. The inference is that the reversal from a decrease to an increase of caries incidence can be fixed to some time in the autumn of 1946. It is apparent that the youngest children and the most recently cut teeth have suffered from the increase. In the sixth class the second molar has been the victim, as may be observed in table 2, which shows an increase of caries of the number of carious twelve-molars since the year 1946—1947. The reason why this development is not seen in the case of the seventh class is the fact that at Ophaugen these classes are examined first, that is about the first of December, and do not yet reveal any increase in caries activity, whereas the sixth class is examined last, in March—April. The reversal, consequently, must have taken place somewhere between the time when the seventh class was examined and the time when the sixth class was examined.

### Clinical Findings.

The clinical findings applying to the carious processes underwent essential changes in the course of the war years. The rapid caries with little or no discolouring of the cavity disappeared rather quickly and was rarely seen after 1942. It was replaced by a more chronically progressing caries with sometimes a very deep brown discolouring of the dentin at the bottom of the cavity, and

rather frequently might be observed carious processes which stopped, especially in the buccal surfaces of molars and sometimes in front teeth and even — though rarely — in proximal surfaces. The result of a process of this description was a discolouration extending in some cases nearly to the dento-enamel junction. This was ascertained on several occasions when such a discolouration was polished and bored up several years after its appearance. Occasionally there was also found a small cup-shaped depression in such a case of arrested caries activity, as a proof that the outermost layer of enamel had suffered from a defect which might justly be called a cavity. This defect had then been removed, probably through wear.

During the spring of 1947 the rapid form of caries appeared again, and is at present more and more prevailing.

### **Nutrition Before the War.**

Exact information about pre-war nutrition in my district is not available, but a general description may perhaps be given on the bases of my impressions during the years before the war.

The diet of the children was relatively rich in carbohydrates, with a large consumption of sugar and some consumption of bolted flour. Cakes were eaten to a comparatively great extent, in particular by children living in the neighbourhood of bakers shops. Farmers, especially, most often used home-baked bread, generally made of bolted wheatflour with an admixture of wheat-bran. Rye, to my mind, was less in use than wheat. Those who bought their bread largely ate white bread, but all in all an examination made in 1938—1940 (ALEXANDER, 2) showed that approximately 55 per cent of the children had whole bread for their school pocket lunch.

In some measure they had cheese and meat on top of their bread-and-butter, but most frequently by far they had sugar and jam. Eggs made part of their diet, but daily consumption of eggs was not a common thing. The consumption of vegetables was slight, that of potatoes higher, especially among the poorer part of the population. The average consumption of milk was at a low level, as it was not uncommon for children to have coffee from the age of eleven or twelve. Cod liver oil was used only to a very limited extent.

### Nutrition During the War.

In an attempt to trace the nutritional changes after the autumn of 1939, the fact first to be observed is the rationing of sugar and coffee.

Pre-war consumption of sugar was approximately 35 kg (77 pounds) per person a year (SCHULERUD, KANTER, and RASMUSSEN, 29), and it was reduced to approximately 18 kg a year, later on to 13 kg, and further to about 11 kg per person a year, excluding the allowance of sugar for preserving. This allowance taken into account, there is still a reduction of 60 per cent. The rationing of coffee did not matter very much in the case of the children, unless upon the supposition that coffee was then reserved for adults, the children thus arriving at a greater consumption of milk. Reports on pre-war consumption of milk in the district are not available.

Later on bread was restricted, but at first coarse meal as well as bolted flour was so abundant that no change worthy of mention was brought about during the first year. Afterwards, when Norway's stock of corn from over-seas had been exhausted, and the percentage of grinding was raised from 67 to 95 per cent, the bread-corn was chiefly of European origin (Baltic rye), and then we got bread which was quite different from our accustomed type.

Before the war and during the first years of the war bread was baked of a flour with great baking power, that is, flour containing protein with a superior capability to form the skeleton of the bread. The European rye needed trebled acidity to give serviceable bread (LARSEN, 15). Bread, therefore, had to be made with leaven, or must have an admixture of muriatic acid to obtain the right degree of acidity. The admixture of acid varied between 10—30 g 10 per cent HCl per liter water, and gave rather sour bread. The sourness was intensified, moreover, by the use of whole meal which contains more acid than bolted flour. This acid derives partly from the phosphate content of the corn, partly from products of decomposition of protein and fat. At last bread was not sold till it was one day old.

The farmers were differently situated. To a large extent they continued to bake their bread of home-grown cereals, that is, the same kind of cereals as before, but as a rule more coarse-ground. Some rural mills, however, often ground the corn at a lower per-

centage of grinding than decreed, and thus in some farmhouses bread which was considerably lighter of colour than was usual, could be seen daily even during the war.

According to information given by Skiens Joint-Stock-Mill — the largest commercial mill of the district — there was a decrease of 70 per cent in the consumption of wheat during the war, and a proportional increase in the consumption of rye. Periodically, when rye was scarce, oats and barley were added to the cereals used for bread, but this admixture never exceeded 10—12 per cent. After 1942 2 per cent powdered lime from Riisnes Lime-Powder Mill was added to the meal used for bread.

By and by meat and pork became scarce, but very often villa-owners kept pigs, especially after 1942. Though there was some trade for meat outside the rationing, from producer to consumer directly, this generally did not influence the daily diet to any degree worth mentioning, as such meat was only to be had at a rather high price and was mostly provided for special occasions.

Eggs, on the contrary, were largely dealt in "illegally", and people often had poultry of their own. The supply of eggs was, therefore, far better than the rationing indicated.

Rather early in the war the rationing of fat became very severe, and the "illegal" trade was inconsiderable. Butter disappeared almost completely. What was to be had was chiefly margarine without any supplement of vitamin preparations. The ration practically all the time was 30 g per person a day.

The scarcity of meat in part caused a very considerable rise in the consumption of fish. Fish of every kind came into use. The supplies of fresh fish often failing, klipfish (salted and dried, split) and stockfish were in extensive use.

There was a tremendous increase in the consumption of potatoes in order to meet the want of calories. The ration of potatoes was 150 kg (330 pounds) per person a year, but this quantity being insufficient in many families, the consumption often exceeded the ration. It was common for people to grow potatoes and vegetables in their gardens and in patches of land, and the larger part of the crop was a legal addition to the ordinary ration.

For the same reason as there was an increase in the consumption of potatoes, there was also an increase in the consumption of vegetables, in particular carrots and swedes.

There was also an increase in the consumption of cod liver oil, a great deal of which, however, was used for dripping, the vita-

mins thus being lost. From 1942, however, the children were given cod liver oil at school, and practically all the children took it, so during the latter half of the war they had cod liver oil every other day in the school year. Of course, a great many children were given cod liver oil at home as well.

The rationing of milk carried with it a decrease of a total consumption of this commodity, but this decrease chiefly bore upon the adults, the children getting milk all the time —  $\frac{3}{4}$  liter for the younger children and  $\frac{1}{2}$  liter for the older. In addition to this, pregnant and nursing women had their daily ration of  $\frac{3}{4}$  liter. It was rather a rare thing for the supplies to be so scanty that milk could not be distributed to all children. Besides this, there was a considerable trade in milk from producer to consumer directly. This "illegal" trade was often based on an agreement permitting milk (1—2—31.) to be fetched once a week, and this permanent contribution to the dietary of the family was surely of great importance.

All in all it must be said that people laid great weight on trying to provide for a diet meeting the requirement of calories as well as that of various dietary element, and that they paid considerably more attention to this than was usual before the war.

As a basis for a quantitative evaluation of the diet during the war there is in the first place DIESEN's (6) calculation of the restricted diet. It shows that pregnant and nursing women as well as children below the age of 6 have been favoured and have had their requirements met both quantitatively and qualitatively. As for older children the difficulties increase with increasing age, and adults are worse off than anyone else. There is a deficiency in calories, owing chiefly to the lack of fat. The supply of iron is inadequate, from the age of twelve especially, and the diet of adults is deficient in calcium. (It does not appear from the article whether the admixture of lime to the bread, which began at that time — the third quarter of 1942 —, has been taken into account.) The children have an adequate intake of vitamins, provided they take cod liver oil, but the diet of adults is deficient in vitamin A. Vitamin C might cause difficulties in spring when the contents of potatoes go down, but it might be supplemented by an increased use of swedes.

As mentioned above, DIESEN's study comprises the restricted diet only. In addition, there was unrestricted food (fish, fish products, shell-fish, and some vegetables) and food of one's own pro-

ducing ("villa-pig", poultry, home grown potatoes and vegetables) and, finally, there was the "illegal" trade. Exact figures for these three factors are not obtainable of course, but STRÖM's (32) study, performed as an investigation of nutrition with direct weighing of the food in use, comprises all the four factors which made up the diet.

This investigation, in fact, shows considerably better conditions than those presented by the figures in DIESEN's article. The supply of fat is low, but there is an adequacy of protein and carbohydrates. Ca, vitamin A, B<sub>1</sub>, C, and D are well cared for, whereas the diet is low in iron. Light attacks of anaemia occurred rather frequently during the war. There was a difference, however, between families with children below the age of 15 and those without. The former have a larger consumption of milk, cereals, and potatoes; the latter consume more butter, margarine, fat, fresh vegetable, fruit, and berries.

STRÖM's investigation was made partly among working class families in Oslo, and there is reason to suppose that their diet did not differ very much from that of industrial workers in Gjerpen. Probably the diet of the latter was somewhat better, as they had greater facilities in getting "illegal" food directly from the farmers than had the population of Oslo. In the case of the farmers the situation was quite different. Among other things their want of fat and animal protein was more adequately met, just as they had more cereals, milk, and butter, and probably more eggs as well.

On the whole the diet was comparatively good in quality, while periodically deficient in quantity.

### **Nutrition After the War.**

After the war there have been great changes in our diet. The ration of sugar in private households is unaltered, but, according to information given by local wholesale dealers in grocery, the sale of factory-made jam and preserved fruit with 40 per cent sugar and of sweet biscuits is more than twice as large as it was in 1939. A considerable increase in the consumption of sugar has thus occurred.

Bread once more is made with yeast only, but more than 90 per cent of the school-children stated that they ate black bread

or brown bread.<sup>1</sup> The consumption of wheat again increased considerably. According to information given by the confectioners the sale of cakes surpassed that of 1939. An inquiry among the pupils of the seventh class shows that it is common for them to eat cakes every day.

Chocolate and sweets are still rationed, but the sale is comparatively large, in particular when it is considered that these goods disappeared completely during the war.

Periodically there have been some supplies of meat and pork, but the supplies are so slight that there is still a large consumption of fish. As the supply of fresh fish has improved, there has been a considerable decrease in the consumption of salted fish and stock-fish; it may almost be said — at least in my district — that they have passed out of the bill-of-fare.

The consumption of eggs is rising steadily, and the ration of butter and margarine is considerably larger than it was during the war. At present it is 50 g per person a day, and a good part of it is in the form of creamery-butter.

There has been a considerable decline in the consumption of vegetables and potatoes, a fact which may chiefly be due to the increase of the ration of bread.

The consumption of cod liver oil is declining, not only because cod liver oil is no longer distributed at school, but also because parents no longer take such care to give cod liver oil to their children.

The supply of cheese is still inconsiderable, while the rationing of milk has been abolished periodically, and the supply has given satisfaction all the time. All in all more milk is marketed than in 1939.

The rapid caries, which practically disappeared after 1942, reappeared in the spring of 1947.

### **Influence of Dietary Changes Upon Caries-Etiological Factors During the War.**

There can be no doubt that the dietary changes account for the reduction of dental caries activity during the war and for the increase of this activity after the war. The question then is which of the caries-etiological factors — as far as we know them

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<sup>1</sup> This and other information on particulars of the post-war diet of the children has been obtained by means of inquiry forms filled in by the parents, but the answers are so heterogeneous and the inquiry form so incomplete that the material does not lend itself to exact numerical treatment. The purpose and the result of the inquiry may be found in tables 8 and 9.

— have been affected by the diet. It is true that in some measure the etiology of dental caries is still terra incognita, but there is every reason to believe oneself on firm ground when basing one's opinion on Miller's theory of caries, which, while it takes into account internal and local causes, defines the carious process as a chemical-parasitic one.

As factors serving to check caries activity must be considered all those that restrain the production of acids and strengthen the power of the teeth to resist the action of acids. Factors promoting caries activity are those that favour the production of acids and weaken the resistive power of the teeth.

### Calcification of the Teeth.

The first consideration is whether the diet imposed by the war afforded possibilities for a good calcification of the teeth. The period of calcification of the tooth is not regarded as being terminated at the eruption. According to investigation by the aid of radioactive isotopes (KOSS and GERIN, 14, VOLKER and SOGNNAESS, 40, WASSERMANN, GROETZINGER and DE WITT, 41, PEDERSEN and SCHMIDT-NILSEN, 22) it must be assumed that after the eruption the enamel is able to assimilate minerals both by the saliva and by the pulp-dentin.

All through the war there was an adequate intake of Ca and P, a fact which was largely due to the admixture of powdered lime to the flour. This lime-powder may be counted an addition to the children's pre-war intake of calcium, as the quantity of milk consumed by the children was any way no less than before the war.

Similarly an adequate intake of vitamins was cared for by the increase in the consumption of potatoes and vegetables, and, in particular, by the distribution of cod liver oil at school. Particular stress must no doubt be laid upon the importance of vitamin D (MELLANBY 16, TOVERUD 38), though the importance of the other vitamins must not be disregarded. The importance of vitamin A has been pointed out by POHTO (24). Owing to the high percentage of grinding at the grist-mills, the intake of vitamin B<sub>1</sub> was large, a fact which is likely to have affected the problem of caries. Vitamin B<sub>1</sub>, moreover, is essential to the metabolism of carbohydrates (SCHUPP-WELLER 31, ENOCHSEN 7, HÖYE 9).

Opinions differ with regard to the relationship of vitamin C to dental caries. SANDBERG and DAGULF (27) and HÖYE (9) hold

that vitamin C does not affect the process of caries, while others (ADLERCREUTZ 1, SCHIØTZ 28, NATVIG 18, HAGTVEDT 8) have shown that vitamin C is an important agent in the formation of dentin, so one had better count on a certain influence on the calcification of the teeth.

Altogether there is reason to believe that all the elements safeguarding the general health of the organism also affect the calcification of the teeth, even though lack of one particular vitamin does not directly bring about caries.

The diet during the war must thus be assumed to have afforded adequate opportunity for a fully normal calcification of the teeth. An essential fact in this connection is no doubt the disappearance during the war of a great many inferior nutrients (sweets, cakes, and so on), an increase thus being brought about in the intake of essential dietary elements.

In this connection something must be said of the problem of phytic acid in the coarse-bolted kinds of meal. According to accessible investigations in this matter (HOFF-JØRGENSEN, ANDERSEN, BEGTRUP, NIELSEN 10, 11, 12) it must be assumed that unbolted meal would influence the resorption of calcium most unfavourably. The phytase present in rye and wheat, however, must be supposed to decompose the phytic acid (MØLLEGAARD 17), in particular when the bread is baked for a long time and with acetic reaction, exactly the way it was made during the war. As for oats, that is perhaps a different matter, but compared to wheat and rye oats made up an inconsiderable share of the supplies of corn. What that share was, there are no exact figures to show, nor is it possible to draw conclusions based on available pre-war figures of production, as the greater part of the oats was then used for animal feeding. Even during the war oats were fed to animals, but not so extensively as before the war.

It may be pointed out, however, that flour with a percentage of grinding as low as 67 or less is a comparatively recent commodity, the product of modern roller mills. If the phytic acid contained in cereals influences the resorption of calcium in such a decisive manner, it might be supposed that signs of rickets would be observed more frequently in teeth and bones of earlier ages. Available studies on this matter do not bear out this supposition (RYGGE 25).

As mentioned above (page 12) the war-time diet was rich in protein and carbohydrates, in part abundant, while low in fat, causing both children and adults to lose flesh, a fact probably of no great consequence.

### Production of Acids.

The production of acids in the coating of the teeth is dependant, for one thing, on the nature of the coating. The essential fact is not the amount of coating on the tooth, but whether in this coating there are carbohydrates fermentable into lactic acid or other organic acids by the activity of the oral flora (*Bac. acidophilus* and *saccharomyces*). Besides this, the production of acids is dependent on the extent to which it can be restrained by the capacity of the saliva to neutralize acid.

Pre-war diet was rich in bolted flour and refined carbohydrates (sugar). According to the investigations of Osborne (KLINGENBERG 13) there is a higher rate of decalcification of teeth in a mixture of flour and saliva where the flour is bolted than in one where it is unbolted, and refined sugar bears the same relation to unrefined sugar. Practically all bolted flour disappeared during the war, and the coating of teeth thus came to consist of a whole-meal mixture. Moreover, bread was sold only when it was one day old. The pasty starch of the bread has then given off some water to the proteins, and at the same enzymes start decomposing the starch, causing the carbohydrates of the bread to be decomposed more rapidly in the mouth, because the glutinous intermediate products (dextrin) have changed into more easily dissolvable compounds. Even though when eaten this pasty war-time bread put rather a heavy coating on the teeth, this coating was washed away more rapidly, in particular because it stimulated the production of saliva owing to its acetous reaction.

The bread was not the only stimulant to the secretion of saliva during the war, other nutrients had the same effect. Prominent among them were vegetables, the use of raw vegetables showing a marked increase. This was certainly due to the fact that the rationing prevented the children from meeting their want of calories by help of bread, and so they resorted to vegetables and potatoes when they were hungry. Their accesses of hunger did not always fit in with the meals, so they often had to eat raw vegetables and potatoes. As this tended to clean the teeth, it was a matter of great consequence. The extensive use made in the diet of salted and dried foodstuffs (klipfish, stockfish, dried potatoes and vegetables) also stimulated the secretion of saliva.

The power of the saliva to neutralize acids is directly dependent on the rate of secretion (SAND 26, CUSHMAN, ETHERINGTON and

THOMPSON 5). Increased secretion makes for a decrease of the viscosity of saliva, that is, the contents of mucine are diminished. It is presumed that the mucine of the saliva will always form on the tooth a film bearing the character of a semi-permeable membrane (BERGVE 3), and the thinner this film is, as it must be supposed to become when the saliva is thin, the easier it is for the bases of saliva to penetrate into the coating of the tooth and neutralize the acid which has been formed there. Observations by OTTESEN (19) in Italy where he found a coating on the teeth free of caries, but with highly alkaline saliva, support this belief. For completeness' sake it must be added that in Italy as in other countries of southern Europe, bread is never made with yeast, but with leaven (LARSEN 15).

### Sugar.

The opinion among the authors tend more and more to give sugar the first place among the caries-etiological factors (TOVERUD 37, WESTIN 42, WILSKA 43 and 44, PEDERSEN 21, SCHULERUD 30). WILSKA set limit to 12—14 kg sugar per person a year, in order to stop the increase of caries frequency to a level like the situation in autumn 46.

The probability is that no inconsiderable weight must be attached to the way in which the sugar is taken, not to the bulk of the entire consumption of it only.

As mentioned above, the diet will increase the buffer capacity of the saliva containing a good deal of mucine and little base. Now if sugar alone is taken, or if it is taken with bread, the production of acid will be more abundant than if it was taken with some foodstuff stimulating the secretion of saliva. In PICKERILL's (23) phrase: "Zahnkaries kann dadurch vorgebeugt werden, dass Stärke und Zucker niemals allein, sondern in Verbindung mit einer sauer schmeckenden Substanzen gegessen werden, oder man esse nachher Substanzen mit alkalischem Potential."

From an investigation at a sugarplantation OTTESEN (20) concludes that the chewing of sugar cane is a caries preventing factor in spite of the contents of sugar, because sugar cane gives an acid reaction. The pH of the saliva increased with up to 1.5 after the chewing.

Owing to the rationing of sugar during the war, the use of sugar on top of slices of bread and butter fell off, as it was necessary to save sugar for preserves, the rationing of sugar for pre-

servicing being too scanty. People being accustomed, moreover, to sweeten their food heavily, the essential part of the sugar ration was spent in the ordinary cooking. Jam now replaced sugar on top of bread and butter, and this jam held far less sugar than was customary before the war, the result presumably being a considerable decrease in the production of acid from sugar.

An investigation made in the winter of 1947 on the importance of sugar used on top of bread and butter shows this to be not at all negligible. The result is given in tables 8 and 9. The children have been divided into two groups: those who use sugar on top of their bread and butter daily or often (yes) and those who do so rarely or never (no).

**Table 8.**

*Difference in percentage of caries between children using sugar on top of bread and butter and those who do not.*

	Number of children using sugar on top of bread and butter		Percentage of carious teeth in children using sugar on top of bread and butter	
	yes	no	yes	no
Gjerpen .....	395	473	13.6	10.9
Siljan .....	46	91	19.2	16.0

The difference is not a great one, but that it is not accidental, is evident from the fact that even in such a limited material as the school-children of Siljan approximately the same relative difference is found if the children are divided into classes. In Gjerpen even greater regularity is found, as may be seen in table 9.

**Table 9.**

*As table 8, divided into separate classes.*

	Percentage of carious teeth in school-children in Gjerpen using sugar on top of bread and butter		Percentage of carious teeth in school-children in Siljan using sugar on top of bread and butter	
	yes	no	yes	no
1st class .....	7.2	5.7	7.4	9.4
2nd class .....	10.1	6.9	25.0	24.1
3rd class .....	12.3	8.4	16.2	12.1
4th class .....	12.4	10.7	11.6	10.1
5th class .....	14.8	13.5	24.2	18.2
6th class .....	16.1	13.2	13.5	16.1
7th class .....	22.2	17.7	31.2	21.9

It will be observed that more than half the number of the children use sugar on top of bread and butter regularly. A discouragingly large number in view of the damage induced.

### Meals at Regular Hours.

Owing to the difficulties in meeting the requirement of calories and to the fact as well that it was now impossible for the children to buy cakes and sweets, which they very rarely got at home, the appetite for the principal meal of the day improved. At the same time, as eating between meals dropped out, a greater regularity in eating-habits was obtained. As pointed out by TOVERUD (36) and PEDERSEN (21) among others, importance must be attached to this factor, which, moreover, is considered partly accounted for the fact that children from infant homes have better teeth than other children (COLLETT 4, TOVERUD 39).

### Rate of Growth.

During the war a retardation occurred in the development of the growing organism. According to information given Women's Clinical Hospital at Bergen (STRÖM 33) a prolongation of the period of gestation was recorded, and similarly the growth in stature of school-children was found to be slower. Information given by the chief medical officer of Skien (SVAAR 34) shows a decrease in the average stature of all school-children from 1940 to 1945, particularly in the age groups 7—12.

In Gjerpen there was no systematic measuring and weighing of all school-children during the war. But going over the health cards of the children of two schools, I have been able to find measurements of the pupils of the first class during the war, and, in spite of the highly limited material, approximately the same conditions are found here. The result is recorded in table 10.

**Table 10.**  
*Difference in stature of first "year" pupils 1940—1945.*

School district	Average stature of school-children in their first year					
	1940	1941	1942	1943	1944	1945
Ballestad .....	123.1	122.9	123.8	124.7	—	119.6
Gjerpen .....	129.1	123.5	123.6	122.0	122.9	121.5

The material comprises only 150 children in Gjerpen and 60 children in Ballestad school district, but the tendency is obviously the same as that which Svaar found at Skien where the results are rendered more apparent on account of the comprehensive material.

**Table 11.**

*Average number of permanent teeth per child 1939—1948.*

	Gjerpen	Siljan
1939—40.....	18.7	
1940—41.....	18.9	
1941—42.....	18.9	
1942—43.....	18.6	19.9
1943—44.....	18.5	19.7
1944—45.....	18.3	19.4
1945—46.....	17.9	19.2
1946—47.....	17.7	19.0
1947—48.....	17.3	18.9

This slowing down of development is also found in the eruption of the teeth. In table 11 is recorded the average number of teeth per child.

As may be seen the average number of teeth per child drops with well over one tooth during the years of the war. Siljan is included only from 1942—1943 and shows a larger number of teeth per child than Gjerpen, but this is due to the above-mentioned fact that the children of Siljan are examined about half a year later than those of Gjerpen.

This lower rate of growth greatly influences the incidence of caries, of course, as it is a well known fact that the highest susceptibility to caries is found in connection with the periods of the most rapid growth. C. SCHIØTZ (28) thus asserts, “— — — an accelerated development of stature and growth carries with it, as it were, an increased risk to that very delicate organ, the teeth”.

**Difference Between Town and Country.**

As afore mentioned, the population of Gjerpen is divided into two parts, one urban, the other chiefly comprising farmers. The diet of these two groups differed in many respects both before and during the war. It has been indicated already (page 9) that during the war the farmers had a kind of bread differing from that which was used by those who had to buy bread or flour. They

also had essentially better opportunities of meeting their want of animal protein and fat, and, churning themselves, they were better off for butter. Moreover, consequent upon the improvement of farmers' finances which took place during the war, they also improved their diet. Previously it was a common thing for them chiefly to use margarine, and their consumption of milk was low, but during the war they saw their way to use more milk for their own household. The consumption of potatoes and vegetables was lower than that of the urban districts though it showed some increase. All in all the farmers were not nearly so much affected by the rationing, especially when nutritional essentials are concerned. It may be said that the farmers profited by the advantages of war-time diet, while escaping its disadvantages.

There was reason to suppose that the teeth of farmers' children should show a steeper decline in the incidence of caries than those of the others. In fact, this appears to have been the case. Figure 5 shows the course of the percentage of caries in three school-districts numbering 160 children chiefly of farmer parentage as compared to a school-district numbering 170 children living in a district of urban character.

It is observed how, from being the highest, the line of the "country" school-districts crossed the line of the "town" school-districts and the line of the entire parish between 1942—1943 and 1943—1944 and becomes the lowest of the three.

In table 10 Gjerpen represents an urban school-district and Ballestad a rural one, and no difference is seen in the slow growth of the children here. It is too slight a material, however, for safe conclusions to be drawn.

As may be seen in figures 1 and 2 the school-children of Siljan show a higher percentage of caries than those of Gjerpen, the cause of this partly being the fact that the former were examined about half a year later than the latter. But it appeared from figure 3 that this difference of time did not fully explain the matter, especially during the latter years of the war. The difference in the percentage of caries may probably be due, in part, to the fact that, owing to the liberality of the rural mills, the farmers had a fair supply of bolted flour during the war, a circumstance which made itself particularly felt in Siljan. Great part of the population of Siljan, however, are lumberers and most likely their narrow circumstances both before and during the war made it difficult for them to provide an optimal diet. Since 1943 the chil-

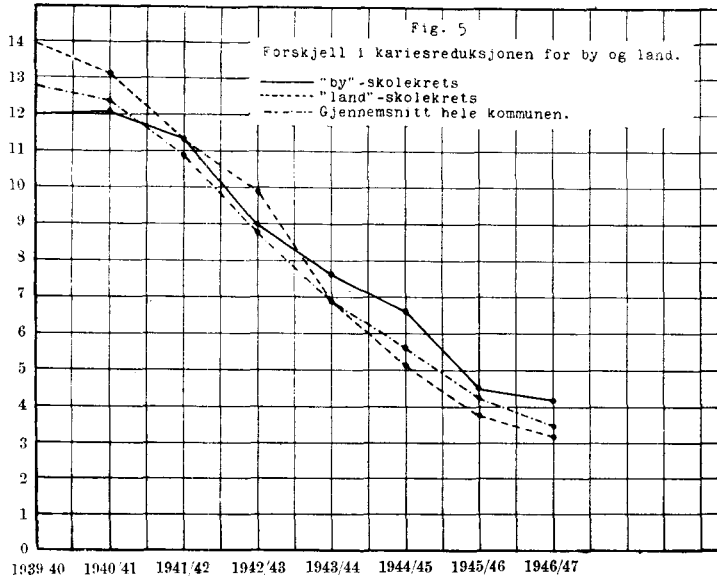


Figure 5.

Difference between the reduction of caries activity in town and that in the country.

- "town" school-district.
- "country" school-district.
- . - . - average of the entire parish.

dren of Gjerpen have had dental treatment even before attaining school age, from the age of three, whereas the children of Siljan get no treatment of the milk teeth of infants is sure to bring about a decrease in the incidence of caries in the permanent set of teeth.

### Increase in Caries Activity After the War.

As shown by the statistics the incidence of dental caries is on the rise again since the autumn of 1946. Keeping in mind the conclusions drawn from our examination of war-time diet, this is only what might be expected when an estimate is formed of the consequences of dietary changes after the war.

The consumption of sugar is rising steadily, the children getting a lot of sugar in cakes, biscuits, sweets, and so on (SCHULERUD: Industrial sugar). As for chocolate I do not think too much importance should be attached to it as long as it is rationed. Ac-

ording to my investigations in the matter practically all the children finish their ration in one or two days, then there is no more until the next distribution; and these two days certainly do not suffice for the chocolate to do any harm.

Bread is acetous no longer and is sold while fresh, but unbolted flour is still used to a large extent.

There is a decreasing consumption of potatoes and vegetables, and cod liver oil is no longer distributed at school. For these reasons there may possibly be a certain deficiency in the intake of vitamins, even though there is a better supply of other food-stuffs rich in vitamins (eggs, fresh fish, butter, and other things).

Owing to much eating of cakes and so on, eating between meals is becoming more and more frequent, and the children meet their need of calories with inferior foodstuffs at the expense of the nutritional essentials.

All dietary elements stimulating the secretion of saliva-sour, salted, and dried food, raw vegetables, and so on, more and more disappear from the diet.

It is a striking fact that the increase in the activity of caries after the war does not show an even increase of the number of cavities in all children. A sudden flash of acute caries in individual children is what is most conducive to the rise of the percentage of caries. This is almost a general rule when inquiry is made into the causes of an increased percentage of caries in a group of children, *e. g.* a class. An examination of the diet of these children does not as a rule reveal anything definite to point out. The explanation suggests itself that the actual increase in the factors favouring caries activity is not large enough, in the case of some children, to bring about an increased caries activity, their defensive power being equal so far to resist the attack, whereas this does not apply to the children suffering from rapidly progressing caries.

### Conclusion.

War-time diet afforded to pregnant and nursing women and to children an adequacy of food essentials. The presumption, therefore, is that conditions were favourable for a good classification of the teeth, and that there a greater immunity to caries than before the war. Doubtlessly importance must also be attached to the retardation of growth which was observed during the war.

The change of the entire supply of carbohydrates and the increased consumption of potatoes and vegetables brought about a marked reduction of local caries factors and increased the defensive powers of the organism against the production of acid in the mouth. A similar effect must be ascribed to the consumption of sour, salted, and dried food.

These observations made during and after the war indicate the demands to be made on a diet which should reduce the frequency of caries to a fairly reasonable level.

First and foremost the diet must have an adequacy of the essential dietary elements (protein, minerals, vitamins), while carbohydrates and fat may to some extent replace one another. A large intake of carbohydrates must not be regarded as harmful, provided it is given in as unrefined a form as possible, that is the least possible quantity of bolted flour and sugar. Moreover, the diet should comprise ingredients stimulating the secretion of saliva (raw vegetables, sour and salted food). The diet should not be too abundant, and should be limited to the principal meals of the day, preferably taken at the same hours every day, the mode of life thus being as regular as possible, with regular habits of sleep and with ample time for outdoor life.

### Summary.

An inquiry has been made into the frequency of caries and the diet before, during, and after World War II. Some statistics are first given, which show the decline in the frequency of caries during the war and the rise beginning in the autumn of 1947.

The changes in the diet during and after the war are reviewed showing that during the war the diet was comparatively good in quality, while periodically deficient in quantity. The changes after the war show the beginnings of a return to pre-war fare.

The influence of these changes on caries-etiological factors is then discussed. It is presumed that there was a good calcination of the teeth during the war as there was a good supply of the food-stuffs supposed to be important in this respect. Moreover, the production of lactic acid on the surface of the teeth was less than before the war, owing to a diminished consumption of easily fermenting carbohydrates as well as to an increase in the power of the organism of neutralising acid consequent upon a livelier se-

cretion of saliva; besides this, the fare contained more of the food-stuffs which serve to clean the teeth. The decrease in consumption of sugar is considered an essential factor, and an inquiry is inserted showing that sugar used on top of bread-and-butter brings about an increase in the frequency of caries.

The rate of growth slowed down during the war, a fact which contributed to the decrease of frequency of caries.

Mention is made of the difference between the diet in the country and that in towns, and it is shown that rustic fare profited by the advantages of the war-diet, while escaping its disadvantages. The frequency of caries also showed a greater decrease in the country than in urban districts.

The dietary changes subsequent upon the war could not fail to bring about an increase in the frequency of caries, involving as they did, an increase in the consumption of easily fermenting carbohydrates, besides a decrease in food-stuffs stimulating the secretion of saliva. In addition, inferior food-stuffs are continually bulking larger at the sacrifice of valuable ones.

The following demands, then, must be made on a diet which is to keep the frequency of caries on a low level: The requirements for albumin, minerals, and vitamins must be fully covered, while fats and carbohydrates may, to a certain extent, replace each other. The consumption of carbohydrates may be great, but it must include only the least possible quantity of refined carbohydrates (sifted flour and sugar). Besides this, the food should stimulate the secretion of saliva and tend to clean the teeth. The diet should be regular as should the mode of life, with plenty of sleep and outdoor life.

### **Zusammenfassung.**

Es ist eine Untersuchung gemacht worden zwischen der Kariesfrequenz und der Kost vor, während und nach dem zweiten Weltkrieg. Zunächst werden einige statistische Angaben gegeben, die eine Abnahme in der Kariesfrequenz während des Krieges und eine Steigerung ab Herbst 1947 zeigen. Eine rückläufige Betrachtung der Kost während und nach dem Krieg zeigt, dass sie während des Krieges qualitativ verhältnismässig gut war, während sie zeitweise quantitativ unzulänglich war. Die Veränderungen nach dem Krieg zeigen einen beginnenden Rückgang zu den Vorkriegsverhältnissen.

Nun wird der Einfluss dieser Veränderungen auf die Karies-etiologischen Faktoren besprochen. Es wird angenommen, dass die Verkalkung der Zähne während des Krieges gut war, weil ein guter Vorrat gerade für diesen Zweck wichtiger Lebensmittel vorhanden war. Weiterhin war die Produktion von Milchsäure auf der Oberfläche der Zähne geringer als vor dem Kriege auf Grund eines geringeren Verbrauches leicht gährender Kohlenhydrate und auch auf Grund einer grösseren Möglichkeit des Organismus Säuren, in Folge einer reichlicheren Speichelabsonderung zu neutralisieren; ausserdem enthielt die Kost mehr solche Nahrungsbestandteile, die dazu beitragen, die Zähne zu reinigen. Die Einschränkung in dem Zuckerverbrauch wird als wesentlicher Faktor betrachtet, und eine Untersuchung wird erwähnt, die zeigt, dass süsser Aufstrich auf dem Butterbrot, eine Steigerung in der Kariesfrequenz herbeiführt.

Die Zuteilung wurde während des Krieges allmählich geringer, eine Tatsache, die zu einer Abnahme in der Kariesfrequenz beitrug.

Der Unterschied zwischen der Nahrung auf dem Land und in der Stadt wird erwähnt, und es wird gezeigt, dass die ländliche Kost von den Vorteilen der Kriegsdiet profitierte, während sie den Nachteilen entging. Die Kariesfrequenz zeigte auch eine grössere Abnahme auf dem Land als in den städtischen Gebieten.

Die Kostveränderungen, die auf den Krieg folgten, mussten eine Steigerung in der Kariesfrequenz herbeiführen, da sie eine Steigerung in dem Verbrauch der leicht gährenden Kohlenhydrate und einen geringeren Verbrauch solcher Nahrungsmittel bedeuteten, die die Speichelabsonderung anregen. Dazu kommt, dass die minderwertigen Nahrungsmittel immer mehr auf Kosten der Wertvolleren zunahmen.

Folgende Forderungen müssen sodann auf eine Kost gestellt werden, die die Kariesfrequenz auf einem niedrigen Niveau halten soll: Die Forderungen auf Albumin, Mineralien und Vitamine müssen völlig gedeckt werden, während Fette und Kohlenhydrate in gewisser Ausdehnung sich gegenseitig ablösen können. Der Verbrauch von Kohlenhydrate mag gross werden, aber muss eine möglichst geringe Menge raffinierter Kohlenhydrate enthalten (feines Mehl und Zucker). Ausserdem soll die Kost die Speichelabsonderung anregen, und dazu beitragen, die Zähne zu reinigen. Die Kost, wie auch die Lebensweise, sollte regelmässig sein, mit viel Schlaf und viel Bewegung im Freien.

### Résumé.

Une enquête a été faite de la fréquence de la carie et du régime avant, pendant et après la guerre mondiale II. D'abord quelque statistique a été donné montrant le déclin de la fréquence de carie pendant la guerre et l'augmentation commençant en automne 1947.

Les changements du régime pendant et après la guerre sont annoncés, montrant que pendant la guerre le régime était d'une qualité relativement bonne, mais périodiquement d'une quantité insuffisante. Les changements après la guerre montrent le commencement d'un retour à la nourriture d'avant-guerre.

Ensuite l'influence de ces changements sur l'étiologie de la carie est discutée. On a présumé qu'il était une bonne calcification des dents pendant la guerre, puisqu'il y avait une grande réserve d'aliments supposée d'être importante à cet égard. En outre la production d'acide lactique sur la surface des dents était moins qu'avant la guerre à cause d'une consommation diminuée de hydrates de carbone aisément fermentants ainsi que d'une augmentation de la puissance de l'organisme de neutraliser l'acide par suite d'une sécrétion plus vive de salive; de plus la nourriture contenait plus des aliments qui servent à purifier les dents. La diminution de la consommation de sucre est considéré comme un fait essentiel, et une enquête a été insérée montrant que le sucre employé au-dessus de pain beurré produit une augmentation de la fréquence de carie.

La vitesse de la croissance s'est ralentie pendant la guerre, chose qui a contribué à la diminution de la fréquence de carie.

L'attention est attirée sur la différence du régime de la campagne et celui des villes, et il est montré que la nourriture de la campagne profitait des avantages du régime de la guerre en échappant aux désavantages. Aussi la fréquence de carie montrait une plus grande diminution dans la campagne que dans les territoires urbains.

Les changements du régime par suite de la guerre n'ont pas pu éviter de produire une augmentation de la fréquence de carie, puisqu'ils ont apporté une augmentation de la consommation de hydrates de carbone aisément fermentants, en outre une diminution d'aliments stimulant la sécrétion de salive. De plus, des aliments inférieurs remplacent peu à peu les aliments plus précieux.

Ensuite il faut demander ce qui suit du régime pour tenir la fréquence de carie sur un bas niveau: Il faut pourvoir complètement aux besoins d'albumine, minéraux et vitamines, tandis que la graisse et les hydrates de carbone doivent dans un certain degré se remplacer l'un à l'autre. La consommation des hydrates de carbone peut être grande mais elle ne doit contenir qu'une quantité si petite que possible des hydrates de carbone raffinés (de la farine blutée et du sucre). Du reste, il faut que la nourriture stimule la sécrétion de salive en vue de purifier les dents. Le régime doit être régulier, comme aussi la manière de vivre, avec beaucoup de sommeil et de bons moments en plein air.

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