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for the Central Health Services Council and the Minister for Health.**

**Contributors**

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# FOOD POISONING

*Prepared by  
The Standing Medical Advisory Committee  
for the  
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and the Minister of Health*

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# GENERAL PRACTITIONERS' MEMORANDUM ON FOOD POISONING

## INTRODUCTION

Food poisoning became a notifiable disease under the Food and Drugs Act of 1938. From time to time, beginning in 1935, advice has been issued to medical officers of health about the investigation and control of outbreaks of food poisoning; and the investigation of the cases and incidents that have occurred, particularly since the establishment of the Public Health Laboratory Service, has led to a much fuller knowledge of the causes of food poisoning.

The various causes of food poisoning are not given in the Registrar General's corrected notifications, but medical officers of health have been requested to report incidents as they occur to the Ministry of Health and to supply an annual report of all food poisoning incidents in their districts. These are combined with the bacteriological reports of the Public Health Laboratory Service and published as an annual report on food poisoning in the *Monthly Bulletin of the Ministry of Health and Public Health Laboratory Service*. An abridged version is included in the Chief Medical Officer's Report.

## TYPES OF FOOD POISONING

Food poisoning incidents are divided into three categories:—

- (1) General outbreaks (two or more cases in different families).
- (2) Family outbreaks (two or more cases in the same family)
- (3) Sporadic cases (single cases which are isolated occurrences having no connection with other cases or carriers).

Each of the three types of food poisoning incidents has particular characteristics. The mortality from food poisoning is very low and virtually confined to the very young or the very old. Some 10–15 deaths are reported annually and almost all fall within these groups, or are suffering from other diseases of a serious nature.

### General outbreaks

Probably all major outbreaks of food poisoning are reported and investigated. This accounts for the decreasing percentage of incidents in which the food vehicle and causative organism are not identified. In the last five years, 35 per cent of general outbreaks were due to salmonellae, 31 per cent to *Cl. welchii* and less than 10 per cent to *Staph. aureus*. No causative organism was isolated in 24 per cent of general outbreaks.



The large number of *Cl. welchii* incidents has recently been a disturbing feature. Most of these are associated with the consumption of pre-cooked meat dishes which are served reheated. If this practice was discontinued, or if the necessary requirements were adequately complied with, the total number of general outbreaks reported annually would be considerably reduced.

### Family outbreaks

The increase over the last five years in the number of family outbreaks reported by medical officers of health may be due to a real increase in the number of incidents, more complete notification by general practitioners or a combination of both these factors. In 30 per cent of the family outbreaks no causative organism was isolated, but in over 60 per cent, salmonellae were responsible. The salmonella infection is spread in many ways, especially in homes where hygienic practices are not rigidly enforced. A member of the family infected outside the home may act as the focus from which cross-infection occurs, and, if an infected person becomes a symptomless excreter, treatment of the carrier state may need to continue for 2 to 3 months or more before the danger of persistent cross-infection is overcome. Domestic pets such as cats, dogs, tortoises and budgerigars, and raw pet foods, such as imported horse meat frequently harbour salmonellae.

### Sporadic Cases

The greatest number of food poisoning incidents are sporadic cases. They are difficult to analyse and some of them could be "stragglers" from an undetected family or general outbreak. In some cases there is no evidence that the infection is *directly* food-borne, and in the last five years, the causative organism remained unknown in just under 35 per cent of cases. Salmonellosis was responsible for 63 per cent of sporadic cases.

### STATISTICS (ENGLAND AND WALES)

During the war years, there were 1,319 reported outbreaks of food poisoning. After 1949, the number increased annually to reach a peak of 8,961 in 1955 (Table I). Since 1955 the figures have decreased, but there is still no cause for complacency. This is illustrated in Histogram I, which shows the number of general and family outbreaks from 1949 to 1963, and in Histograms 2 and 3 which give an analysis of presumed causes of the outbreaks occurring between 1952 and 1963. A breakdown of all food poisoning incidents according to type of incident, and presumed cause from 1949 to 1963, is given in Table 2.



## NOTIFICATION

Notification of food poisoning under the Food and Drugs Act, 1955, aims to ensure that the medical officer of health is informed of all illness occurring in his district which is believed to have been caused by food, excluding those cases in which food has been the vehicle of an infectious disease notifiable in its own right (i.e. bacillary dysentery, typhoid or paratyphoid fever).<sup>(1)</sup>

Notification is certainly incomplete. The Registrar General's corrected notifications for the years 1954-56 show that in 80 county boroughs the average annual incidence varied from 1-200 per 100,000, the median figure being 19-20. This wide variation cannot be explained by differences in the standard of food hygiene. With the co-operation of medical officers of health a small survey was carried out in eight towns. Over a period of two years corrected notifications from general practitioners were compared with the populations served by those practitioners. There was a total of 704 notifications in the two years from this population of 404,000, in the eight towns giving an annual average incidence of food poisoning of 87 per 100,000. *Salmonellae* were isolated in 46·9 per cent of the cases, *Cl. welchii* in 15·4 per cent, *Staph. aureus* in 1·2 per cent and various other causes in 1·5 per cent. No cause was found in 35 per cent of the cases.

The annual reports from medical officers of health revealed in another instance that of 5,060 known cases of food poisoning only 2,189 had been formally notified. The medical officer of health frequently has information of food poisoning outbreaks direct from schools, colleges, canteens, etc., and many of the individuals involved are not sufficiently ill to call in their general practitioner. Similarly, when cases are notified, the enquiries made by the medical officer of health may lead to the discovery of further cases or carriers. Nevertheless, the 1956-57 survey indicated that not all doctors always notified cases or suspected cases of food poisoning.

There is evidence that failure to find the cause of food poisoning in some outbreaks is due to delay in making the notifications; investigations are then started late and the possible food sources are no longer available for examination. Not all persons suffering from food poisoning consult their doctor, but when they do so, prompt notification, by telephone if need be, is important. The food source may then be detected, the causative organism is more likely to be found, the food hygiene fault can be traced and action taken to prevent further incidents. The knowledge of what has gone wrong, and where, enables more effective advice to be given.

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<sup>1</sup> Mem. on Typhoid and Paratyphoid.



## PRINCIPAL FEATURES OF THE SEVERAL TYPES OF FOOD POISONING

<i>Agent</i>	<i>Ingestion/onset time</i>	<i>Main Symptoms</i>
Chemical (irritant)	Very short, 10 minutes to 2 hours	Nausea, abdominal pain, vomiting and diarrhoea.
Staphylococcal toxin	1-6 hours	Salivation, nausea, vomiting, abdominal pain, prostration and subnormal temperature.
Salmonellae	12-48 hours	Abdominal pain, diarrhoea, vomiting, fever.
<i>Cl. welchii</i>	8-24 hours	Abdominal pain, diarrhoea, and often a mild vertigo.
<i>Cl. Botulinum</i>	12-36 hours	Change of voice, diplopia, ptosis, cranial nerve palsies, obstinate constipation.
Other "non-specific" bacteria.	3-18 hours	Diarrhoea, abdominal pain, vomiting.
Chemical (neurotoxic).	(i) Early	(i) Early muscular paresis (e.g. organo-phosphorus compounds such as parathion).
	(ii) 10-12 days	(ii) Delayed flaccid paralysis (e.g. orthotricresyl phosphate, an oily fluid sometimes mistaken for edible oil)

### Important Factors in relation to Food Poisoning Incidents.

- i The foodstuff, or one of its ingredients, may be primarily infected and the infection may survive the cooking or other preparation of the food.
- ii A primarily infected foodstuff may contaminate equipment and lead to the secondary infection of other food products.
- iii The amount of noxious material which survives cooking may be small so that immediate consumption causes no harm. Delay in consumption, inappropriate storage (neglect of, or misuse of refrigeration) and bad handling can lead to the growth of organisms—sometimes with the formation of enterotoxin—and cause frank disease.
- iv An infection introduced by food handlers can survive and multiply in products such as cream, imitation cream, cus-



tards, table sweets, cold meats, meat products, soups and gravies. Under conditions of inappropriate storage (particularly in the home) these foods may easily become dangerous.

### **Differential Diagnosis.**

Nausea, vomiting, diarrhoea, and abdominal pain are the chief clinical features of several common communicable diseases as well as food poisoning. Those which may occur in the form of localised outbreaks and be mistaken for food poisoning are:—

#### **(a) *Bacillary Dysentery***

The disease is acute in onset. Diarrhoea is the chief symptom, and it is often associated with fever and tenesmus. In severe cases the stools are frequent and may contain blood and mucus. In minor cases differentiation from food poisoning may only be possible after laboratory tests. Outbreaks are commonly associated with children's nurseries and mental or geriatric hospitals. Foods can be the vehicle of infection, but more commonly the spread is due to cross-infection.

#### **(b) *Epidemic Nausea and Vomiting***

The symptoms are nausea associated with irritation of the upper alimentary tract. Diarrhoea often occurs but vomiting is less prominent than nausea. Fever above 100°F is unusual. The incubation period is 2–7 days and in a household or community there may be an interval between cases or groups of cases. Food poisoning can be excluded usually on circumstantial grounds and by the completely negative results of laboratory examinations. This illness is sometimes referred to as winter vomiting disease though it may occur all the year round.

### **SPECIAL ENQUIRIES IN CASES OF SUSPECTED FOOD POISONING**

When food poisoning is suspected the following points are important:—

- (a) The date and time of the first symptoms, the nature of the initial and subsequent symptoms, their severity, duration, and whether they are accompanied by fever or followed by signs of central nervous system involvement.
- (b) The date and hour at which the suspected food was eaten and details of any other foods eaten which might have been the cause.



- (c) If the food was consumed at home specimens of any left over should be kept for laboratory examination. If notification is made promptly the medical officer of health normally arranges for this to be done, but circumstances may be such that the practitioner may have to do this himself.
- (d) Enquiries will normally cast suspicion on particular foods. In outbreaks of bacterial food poisoning, foods most likely to cause trouble are cooked meat, gravy, eggs, milk products such as custard, and imitation cream.
- (e) At least 2-3 ozs. of any suspect food should be sent to the laboratory, if possible in sterile containers. The laboratory should also be given information on the method of cooking the food, when it was cooked, and how it was stored.
- (f) If canned foods are suspected the remains of the particular can and the can itself should be submitted for examination. Code numbers, markings, and other relevant details on the can are important.
- (g) If chemical poisoning is suspected a specimen of the vomit, as well as the suspected food, is of particular importance.
- (h) If the food was eaten away from home any relevant details of the meal, and the address of the place where the food was consumed, should be noted.
- (k) Specimens of the faeces or vomit taken for dispatch to the nearest Public Health Service Laboratory should be put in clean glass containers.
- (l) The isolation of the causal organism is more likely to be successful from a rectal swab. Such specimens should be sent to the laboratory as soon as possible after they have been taken.

## FOOD VEHICLES

The bacteria which are most frequently met with in food poisoning incidents are the salmonellae, *Cl. welchii*, and *Staphylococcus aureus*.

### Salmonellae

Salmonellae are found in all foods of animal origin—meats, meat products, soups, milk, eggs, and foods such as custards and cream cakes in which the egg products would only be partially cooked. All of these foods can be contaminated after cooking. Over 800 salmonella serotypes are known but less than 200 of these



have been found in humans in this country. Of these about fifty are responsible for most of the salmonella food poisoning incidents reported.

*S. typhimurium* is responsible for 65–70 per cent of all salmonella incidents, and other salmonellae commonly found are *S. bredeney*, *S. enteritidis*, *S. heidelberg*, *S. newport*, *S. stanley*, and *S. thompson*.

### ***Cl. welchii***

Meats and meat products—soups, gravy, etc.—are almost always the food vehicle. *Cl. welchii* is a common cause of food poisoning in communal feeding establishments and almost always associated with meat dishes which have been cooked the day before consumption. If this is a necessary practice the pre-cooked dish must be rapidly cooled, kept in a refrigerator overnight, and when re-heated it must be cooked as thoroughly as if it was raw meat. When cold meats are associated with this form of food poisoning it suggests the joints were slowly cooled at room temperature.

### ***Staphylococcus aureus.***

A staphylococcus infection of foodstuffs can almost invariably be traced to faulty handling and is usually human in origin. Foods such as meat products (frequently cold meats served as sandwiches), milk, custards, and egg products can be contaminated either before or after cooking. *Staph. aureus* produces a heat resistant toxin, and subsequent cooking will not make the food safe.

## **LEGISLATION**

The first Food Hygiene Regulations, 1955, were made under Section 13 of the Food and Drugs Act, 1955, although local authorities had powers to make bylaws controlling food hygiene before this date. Various amendments have since been made and the regulations now in force are the Food Hygiene (General) Regulations, 1960. These lay down requirements relating to the construction of and equipment used in food premises, the transport of certain foods, the temperature at which food must be stored, and, in particular, regulations relating to food handlers in a food business.

Food handlers who are suffering from, or are carriers of, a salmonella infection (including typhoid and paratyphoid), or who have a staphylococcal infection likely to cause food poisoning must be reported to the medical officer of health. Under the Public Health (Infectious Diseases) Regulations, 1953, they can be suspended



from work as food handlers and under the Public Health Act, 1961, compensation for loss of salary is provided for in certain circumstances.

## GENERAL

Food technology includes all aspects of food production from the farm to the consumer. It also deals with the construction and planning of food premises and their equipment, temperature controlled storage, the packing and transport of foods, and the bacteriology of food-stuffs—including contamination by spoilage bacteria and human pathogens. The application of this knowledge is the practice of food hygiene, now recognised as an essential part of business by all sections of the food trade. It is equally important in the home. Very few foods can be expected to be sterile, but all should be safe for human consumption. An outbreak of food poisoning implies a breakdown in food hygiene in the home, the retail shop, the restaurant or canteen, the factory, or even possibly on the farm. In a retail food shop or catering premises such a breakdown in hygiene could lead to a continuing source of food contamination by cross-infection through equipment or utensils. In a food processing factory the contamination might involve a whole production batch of one foodstuff or the cross-infection of other items.

The modern housewife is not always aware that pre-packed foods, frozen or otherwise specially prepared for convenience in the home kitchen, require care in handling. Frozen foods, for instance, should be taken home and put in the larder or refrigerator as soon as possible. Raw pet foods should be kept apart from those which are for consumption of the family, and foods left over from one meal for consumption later must be kept under cool conditions (i.e. in a larder or refrigerator). Failure to observe simple points like these, or to pay attention to personal hygiene, have often led to family outbreaks of food poisoning.

The detection of the source of the infection under modern conditions of food preparation is particularly important not only to eradicate the fault but to prevent an outbreak spreading to other persons. Unless notification of food poisoning is prompt the medical officer of health is seriously handicapped in making investigations and his chances of success in detecting the fault are reduced accordingly.



**TABLE 1. [ENGLAND AND WALES]**  
**Food Poisoning Incidents by Type—Annually 1949-1963**

	General outbreaks	Family outbreaks	Sporadic cases	Total
1949	410	265	1,753	2,428
1950	539	453	2,987	3,979
1951	343	287	2,717	3,347
1952	372	340	2,807	3,519
1953	492	422	4,363	5,277
1954	506	630	4,880	6,016
1955	612	723	7,626	8,961
1956	563	616	6,534	7,713
1957	473	501	6,097	7,071
1958	285	601	6,414	7,300
1959	295	666	6,885	7,846
1960	262	616	5,550	6,428
1961	229	490	4,168	5,387
1962	159	551	3,811	4,521
1963	196	510	3,759	4,465



TABLE 2. [ENGLAND AND WALES]  
FOOD POISONING INCIDENTS ACCORDING TO TYPE OF INCIDENT AND PRESUMED CAUSE  
ANNUALLY 1949-1963

	GENERAL OUTBREAKS					FAMILY OUTBREAKS					SPORADIC CASES					All other incidents
	S. typhimurium	Other Salmonellae	S. aureus	Cl. welchii	Unknown	S. typhimurium	Other Salmonellae	S. aureus	Cl. welchii	Unknown	S. typhimurium	Other Salmonellae	S. aureus	Cl. welchii	Unknown	
1949	96	37	62	—	152	136	38	27	—	47	811	251	8	—	675	88
1950	126	38	45	24	281	252	51	22	—	111	1,186	368	15	—	1,415	45
1951	77	49	40	17	156	138	37	23	3	84	1,001	366	2	—	1,347	7
1952	83	34	44	19	183	159	56	29	1	90	1,346	420	9	—	1,028	18
1953	162	51	58	20	198	260	59	31	3	67	1,983	599	43	2	1,735	6
1954	140	37	52	44	225	399	71	37	3	117	2,449	412	38	1	1,980	11
1955	82	41	64	76	341	375	129	40	9	165	3,742	900	34	5	2,941	17
1956	77	37	60	69	304	336	115	22	3	137	2,763	995	49	5	2,722	19
1957	61	35	56	65	252	196	127	32	15	129	2,674	1,125	40	13	2,244	7
1958	41	36	26	69	111	237	91	23	10	240	3,051	1,385	76	9	1,893	2
1959	52	42	31	79	91	249	102	34	17	264	2,897	1,696	53	14	2,225	—
1960	56	28	30	72	74	233	76	35	14	257	2,618	943	33	11	1,945	3
1961	40	36	26	61	66	195	95	31	6	158	2,268	1,137	34	16	1,212	12
1962	32	22	16	41	48	229	142	16	8	155	1,603	818	111	35	1,244	1
1963	40	31	10	62	48	209	116	11	9	164	1,571	1,002	53	11	1,122	6



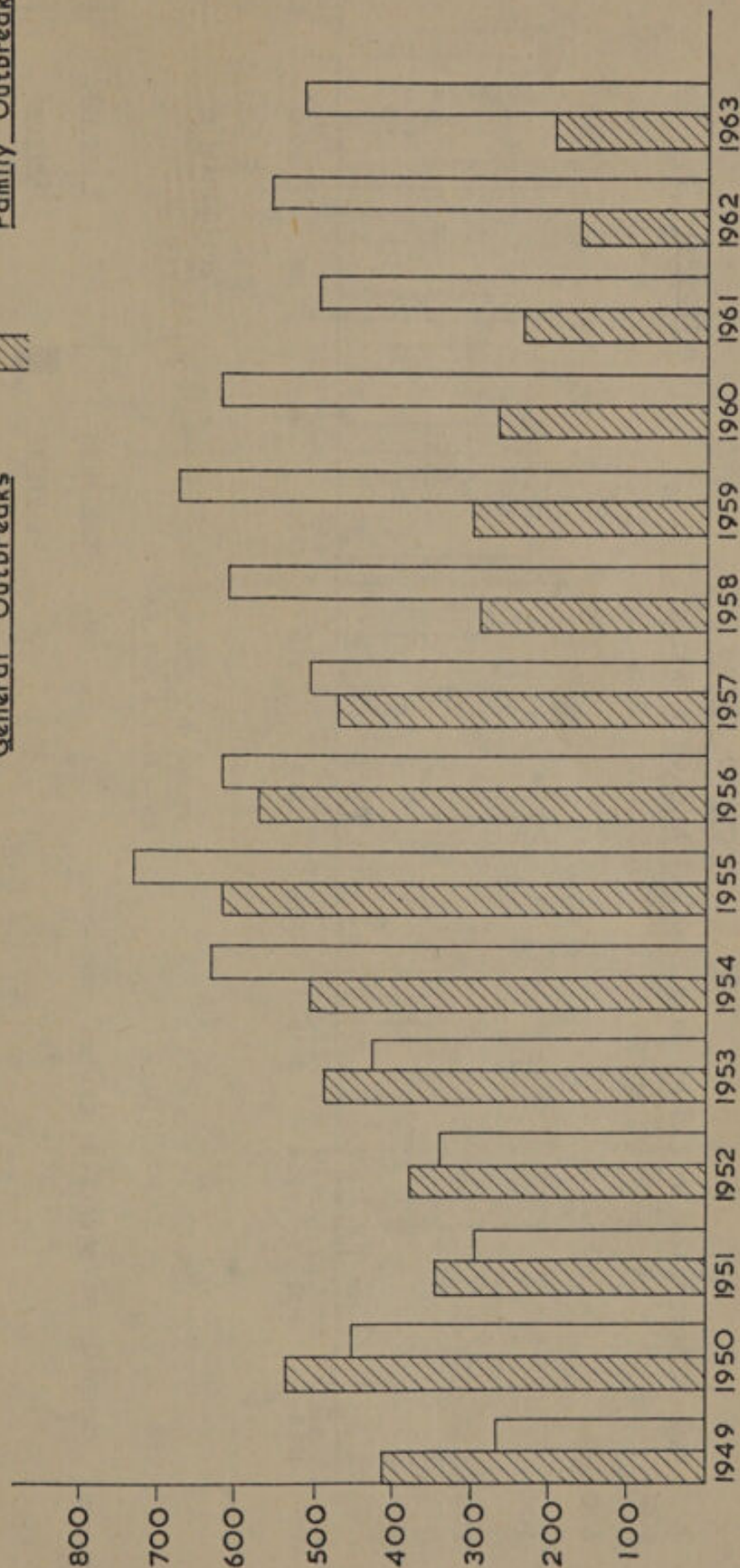
FOOD POISONING INCIDENTS 1949-1963 (ENGLAND & WALES)



General Outbreaks



Family Outbreaks



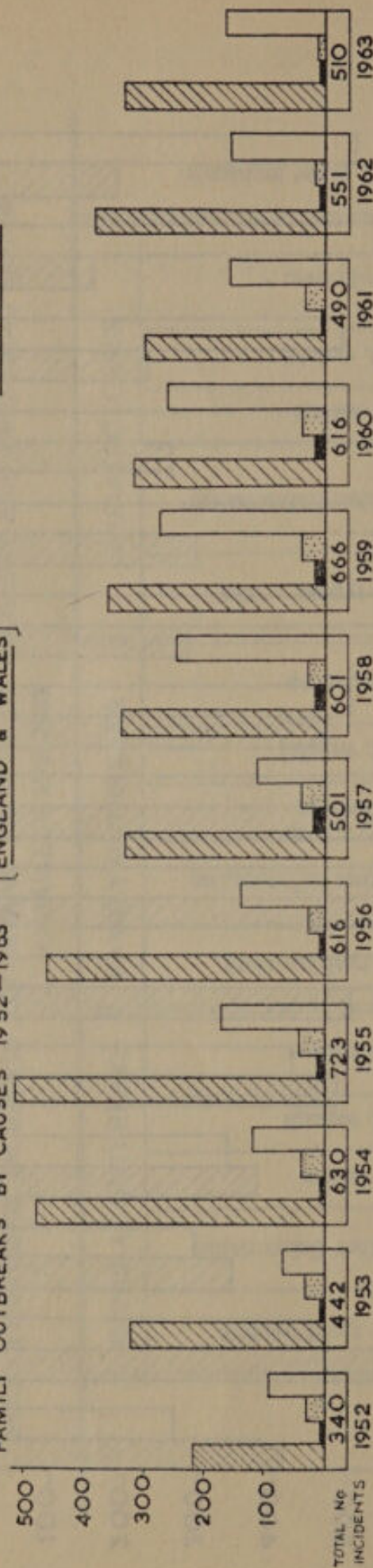


# FOOD POISONING

[ENGLAND & WALES]

FAMILY OUTBREAKS BY CAUSES 1952-1963

HISTOGRAM 2



HISTOGRAM 3

FOOD POISONING  
[ENGLAND & WALES]

GENERAL OUTBREAKS BY CAUSES 1952-1963

