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MERCHANT SEAMEN DURING THE WAR

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INTRODUCTION

The paper deals with the mortality and sickness of merchant seamen and with certain other matters that were connected in one way or another with the main subject.

The work underlying the paper was undertaken for the Ministry of War Transport (now the Ministry of Transport) and a report differing little from the present paper was completed in March 1946. I am much indebted to the Minister of Transport for leave to publish the information and for his interest in the work. I should also like to put on record the encouragement I received at an earlier stage from his predecessor and throughout from Sir Cyril Hurcomb, the Secretary (Director General) of the Ministry. Though I am, of course, responsible for the statistical analysis, I have had much help and criticism from the Registrar-General of Shipping and Seamen, Mr W. J. Killingback, M.B.E. Both he and the office of the Registrar-General of Shipping and Seamen at Cardiff, especially Mr C. F. Knight, have given me valuable information and advice without which I should have been in still greater difficulty in understanding and interpreting the statistics. Mr E. A. J. Heath, F.I.A., who was an Assistant Statistical Adviser at the Ministry, made the analyses of the discharges on grounds of ill health which are given in paragraphs 15–18 and in Tables 6 and 7. His experience of permanent sickness insurance was a valuable asset; he also helped in other ways in connexion with the work.

I have not attempted since last March to bring the figures still further up to date. Any modification would be small and could not affect the conclusions; absolute finality would not be reached for some time, even possibly a year or two.

I have relegated to an appendix the discussion of certain points that were not, it seemed, convenient to include in the paper itself. Such of them as relate to the statistical information supplied in peace-time are given to show the difficulties that have always existed in connexion with the statistics of the casualties and population of merchant seamen and in the hope that they may be of some help in deciding what it will be best to provide in future. The achievement of the most suitable tabulation must be of interest both to the shipping fraternity and in official circles.

MORTALITY AND SICKNESS

1. Attention has been drawn in Parliament and elsewhere to the high death-rate from enemy action among merchant seamen, and it is advisable to set out the available figures, to point out the difficulties that are inherent in their interpretation, and to draw such conclusions as are legitimate from the information.

2. Table 1 gives the deaths of seamen (excluding deaths on fishing boats and on foreign ships) reported to the Registrar-General of Shipping and Seamen.* The deaths are given according to the period in which they were recorded, so that the deaths shown in 1937 occurred mainly in that year but, owing to delay in notification, included some deaths that occurred in 1936 or even in earlier years. The average delay in notification was about two months in peace-time; in war-time it has been greater. Consequently the full effect of the war cannot emerge until some months after the cessation of hostilities, even apart from a few further casualties from uncleared mines.

Table 1. Deaths and supposed deaths of seamen (excluding fishermen) on British ships and ashore abroad, reported to the Registrar-General of Shipping and Seamen

Year	Total no. of deaths	Deaths from enemy action		Deaths from other causes	
		Total	Lascars (included)	Total	Lascars (included)
1933	747	—	—	747	—
1934	668	—	—	668	—
1935	871	—	—	871	—
1936	760	—	—	760	—
1937	842	—	—	842	—
1938	996	—	—	996	—
1939 (to Aug.)	663	—	—	663	—
1939 (from Sept.)	531	237	25	294	53
1940	4,185	3,148	218	1,037	231
1941	10,127	8,848	1,367	1,279	267
1942	6,457	5,442	822	1,015	185
1943	8,494	7,425	1,571	1,069	197
1944	2,420	1,598	570	822	141
1945 (to Sept.)	1,582	870	260	712	163
1945 (from Sept.)	222	222	70	—	—
Totals from Sept. 1939	34,018	27,790	4,903	6,228	1,237

Note. 'Supposed deaths' relate to cases where a ship is missing or sunk and missing seamen must be regarded as having lost their lives.

As the primary object of our investigation is to study the effect of the war we must not include deaths from causes other than enemy action notified after the war ended, because, though some of them occurred during the war, owing to delay in notification there were some peace-time deaths included in the earliest war period. The deaths from other causes recorded during the war period approximate to the deaths from those causes that occurred during the war, as there is no reason to think that the delayed notifications after September 1939 differed appreciably in number from those that had not been notified when the war ended. The work that would be entailed in obtaining the exact number of deaths that occurred during the war from other causes would be great, and it

* Vessels chartered to the United Kingdom under 'bareboat' charters (e.g. those vessels obtained under the 'lend-lease' arrangements with the United States of America) sailed under the British flag and were manned by British seamen. Casualties among the crews of these vessels are included in Table 1, and the tonnage is included in the figures used in making the estimates of population in paragraph 5.

is doubtful whether the figures could now be produced. In the case of deaths due to enemy action, there was no corresponding lag at the beginning of the war, so all such deaths notified after the end of the war must be included. We cannot, however, postpone the investigation indefinitely, and by taking the figures for deaths from enemy action up to the end of December 1945 we shall obtain a total which will be but little in error, except that the records of deaths among prisoners of war, especially those in Japanese hands, and the records of missing men in the Far East are still incomplete.

Table 1 includes all deaths among these last-mentioned groups that were sufficiently certain to justify issuing certificates of death, but there were also the following:

		Total	Of which Lascars (included)
(i)	Prisoners of war in Far East reported to have died, but not yet included in the death registers owing to insufficient details	165	23
(ii)	Persons known to be prisoners of war, but not yet accounted for:		
	European theatre	46	36
	Far East	64	3
(iii)	Named men reported missing in Far East from ships (mostly United Kingdom registered) whose crew lists are in hand	443	90
(iv)	Missing men from lost ships, estimated according to tonnage of vessels, where there were no crew lists received, or due, and no knowledge as to actual personnel	4537	3600

There is little doubt that the numbers shown in (i) and (iii) should be added. The latter are probably dead from enemy action because in most cases the ships were lost or severely damaged by the enemy. The figures in (ii) relate, so far as non-Lascars are concerned, mainly to non-British members of United Kingdom ships, and it is difficult to say whether they are dead or have found their way back to their own countries. It is possible that the Lascars may have undertaken work in the enemy country. There is an element of uncertainty, but it is unlikely that the deaths will be overstated if we increase the total deaths in Table 1 by 600 and the Lascar deaths by 110. Any division between 'enemy action' and 'other causes' is somewhat arbitrary, but 440 might be ascribed to enemy action of which about 90 would be Lascars. Group (iv) is simply an estimate of missing men from ships of a class which would not be reported to the Registrar-General of Shipping and Seamen in peace-time, and if the deaths among them are included a comparison with the deaths in peace-time will be rendered incorrect.

Adding the figures mentioned above to the totals of Table 1 we reach the following:

Deaths from enemy action	28,230, of which 4,993 were Lascars
Deaths from other causes	6,388, of which 1,257 were Lascars
Together	34,618, of which 6,250 were Lascars

It may be mentioned that the distinction between deaths from enemy action and deaths from other causes is uncertain, as it is not always known at the time of notification whether death should be attributed to enemy action; the

table gives the figures correctly according to information available up to the end of 1945, and it is unlikely that subsequent adjustments will be of importance from a statistical point of view.

3. The figures given above show that not only have there been over 28,000 deaths due to enemy action, but that there has been an increase in the number of deaths from other causes as compared with deaths of seamen in peace-time. The obvious inference is that this increase is due to increased marine accidents, worse conditions, greater exposure, etc., but such causes as the following, which we will examine one by one, might account for the increase wholly or in part:

(i) different registration, i.e. deaths have been included during the war that would not have been included in peace-time;

(ii) increased population of seamen;

(iii) increase in the average age of seamen;

(iv) a less good state of health of the men sent to sea owing to shortage of seamen;

(v) a general increase in mortality during the years of the war.

REGISTRATION OF DEATHS

4. The Registrar-General of Shipping and Seamen is of the opinion that certain small war-time changes in the recording of deaths have not materially affected the value of the figures, which relate throughout to all deaths reported to him, excepting deaths of fishermen, members of the crews of foreign chartered or requisitioned ships, services personnel and passengers. They include a number of deaths of seamen ashore abroad shortly after leaving their ships.

The figures relate mainly to deaths of the seamen of United Kingdom registered ships sailing at one time or another from the United Kingdom, but include a small number of deaths in ships registered in the Dominions and Colonies and in India. It is considered probable, however, that the number of deaths included in respect of ships registered outside the United Kingdom does not exceed the number of deaths on United Kingdom registered ships trading from India and from other ports abroad for which returns were not due to be rendered to the office of the Registrar-General of Shipping and Seamen.

The crews of armed merchant cruisers and naval commissioned merchant ships under certain agreements (T. 124, etc.) are treated in all respects as part of the Royal Navy, and deaths among these crews are not included in Table 1. A seaman is given a British Seaman's Identity Card, and this has to be exchanged for a civilian Identity Card when he ceases to be in the Merchant Service. So long as he holds the Seaman's Identity Card the Registrar-General of Shipping and Seamen would normally hear of his death, but it would not be included in the figures in Table 1 if the seaman died ashore in the United Kingdom, and his death would be included in the returns to the Registrars-General of Births and Deaths of England and Wales, Scotland and Northern Ireland. Thus, if a man has been discharged at a British port because his state of health is such that he cannot continue his occupation, his subsequent death would not be included in the table. As regards deaths from enemy action, the Registrar-General of Shipping and Seamen does not include those who die ashore in the United Kingdom after leaving their ships, and the figures given

in Table 1 understate therefore the mortality from enemy action. The Ministry of Pensions may grant pensions in these cases, and it might be thought that an adjustment could be made with the help of their figures, but I fear this is impracticable. The application for a pension may be made years after the event, and as a pension may be granted if death is indirectly attributable to the war there would ultimately be a different definition of enemy action from that assumed in the Table—a definition, moreover, to which we could not conform in the statistics at the present time. It seems necessary therefore to use the figures as they stand and to bear in mind the limitations involved. Some comments are given in Appendix (*b*), and Appendix (*a*) explains why the figures in Table 1 do not agree with certain other statements, and sets out such information as has reached the Registrar-General of Shipping and Seamen from the Ministry of Pensions.

POPULATION OF SEAMEN

5. A census of seamen employed on 15 June of each year was taken in peace-time. It relates to sea-trading vessels (other than yachts and fishing vessels) registered in the United Kingdom. It is compiled from lists of crews and other documents received by the Registrar-General of Shipping and Seamen and shows only those employed on a particular day.

The total figures for 1936, 1937 and 1938 are taken from the *Census of Seamen*. These figures in Table 2 probably exclude seamen known to have been ashore in hospitals abroad, and deaths among such seamen would be included in Table 1, so that to this extent Table 2 underestimates the population comparable with the deaths.

Table 2. Seamen enumerated at annual *Census of Seamen* on 15 June

	1936	1937	1938
British: Officers	25,773	27,260	26,768
Others	76,114	82,467	80,320
Foreign: Officers	198	343	252
Others	5,196	7,191	6,791
Lascars	41,760	43,887	45,182
Total	149,041	161,148	159,313

While, subject to the limitation just mentioned, the census figures are on the same basis as the deaths (so that the two can be related), the *Census* does not tell us the total population of seamen, because there will be seamen ashore in the United Kingdom either on leave from their ships or temporarily unemployed. In the Board of Trade's pre-war *Return of Shipping Casualties and Deaths* a statement is given of the approximate number of persons forming the first crews of sea-trading vessels actually employed during the years specified, and these figures show higher totals than those of the *Census* (see Table 3, which gives the figures for 1936, 1937 and 1938). These figures, though they are open to certain criticisms (see Appendix (*c*)), probably give a better estimate of the total number of merchant seamen, but it would be wrong to use them in studying mortality, because the deaths of seamen ashore are excluded as already explained.

Table 3. Approximate total of first crews of sea-trading vessels actually employed during year

	1936	1937	1938
British	130,830	133,110	131,885
Foreign	7,830	8,920	9,790
Lascars	47,310	48,660	50,700
Total	185,970	190,690	192,375

When we come to the war years we are in the difficulty that no census is available, and we have therefore no figures similar to those in Table 2. We know, however, that the amount of tonnage for which crews had to be found was less than before the war, and that in estimating the population of merchant seamen for comparison with the deaths in Table 1 we must exclude the armed merchant cruisers, etc., because the crews are counted as on 'Naval' and not 'Merchant' Service. During the war, moreover, the tonnage laid up for long repairs and therefore not requiring crews has been greater than in peace-time. Further, the proportionate amount of passenger tonnage has decreased and the average size of non-passenger vessels has increased. As passenger vessels require larger crews per ton of shipping, this would have indicated, on peace-time standards, a decrease in crew compared with tonnage. The decrease indicated by all these factors would be at least 15%, but, on the other hand, cargo vessels carried more men than in peace-time and passenger vessels less; the average increase may be put at 5% of the pre-war crew, leaving a net decrease of about 10%. The whole question would be affected, however, if the average time spent ashore in the United Kingdom by seamen in war-time was materially less than that in peace-time, because a seaman would then be more likely to be counted in a census. In such circumstances a census in war-time would give a larger population than in peace-time, even if the total real population of seamen were the same, or might offset a decrease in the total population of seamen resulting from a decrease of tonnage. There is a further complication, because if a seaman is engaged on very short voyages he is more likely, if ill, to reach a United Kingdom port alive, die in the United Kingdom, and therefore not appear among the deaths in such a tabulation as Table 1. Thus, for example, the northern European trade ceased after the fall of France, and if United Kingdom registered ships, formerly on this service, were employed on longer routes the effect might be substantial. Much of this shipping was, in fact, transferred to United Kingdom coastal work and made no longer voyages than in peace-time, so the effect could not have been great. This, however, is only one simple example of the changes that have occurred and might have affected the figures that should be used as a war-time estimate of the *Census of Seamen* similar to that obtained in peace-time, but I have come to the conclusion that it is unlikely that the total effect is material, and I have set out the evidence, such as it is, in Appendix (*d*).

The general conclusion is, therefore, that, if censuses had been taken on the same lines as before the war, we should have obtained figures for the war period less by about 10% than those of the censuses in 1937 and 1938, owing to the decrease in British registered tonnage, the exclusion of vessels such as armed merchant cruisers, etc., and the heavy amount of tonnage under repair, but

allowing for the increased size of crews. It is possible, however, that my view as to the alterations in voyages may be wrong, and I shall therefore also show the conclusions that would be reached if there had been no change in the census figures.

AVERAGE AGE OF SEAMEN

6. The *Census of Seamen* gives the age distribution of British and foreign seamen, but not of Lascars. The average age on 15 June 1938 was about 36. A complete tabulation of seamen by age is not available for the war years, but two samples of British seamen of 500 each were taken in 1945, from which it appeared that the average age was about 32. This is sufficient evidence that the average age in war-time was less rather than greater than it was immediately before the war.

STATE OF HEALTH OF MEN GOING TO SEA

7. There has been no relaxation in the rules as to evidence of fitness, but possibly the strain of service may have had some effect. This, however, could be regarded as a cause due to the war. Those entering the Service during the war were examined medically; every entrant was not necessarily examined before the war.

GENERAL CIVILIAN WAR-TIME MORTALITY

8. If the mortality, apart from deaths by enemy action, had increased in the years of the war, for instance from epidemics, we should expect to find a corresponding increase in deaths from 'other causes' among merchant seamen. Judging from the insurance offices' experience there is no reason to accept this as an explanation. There is, in fact, some evidence that apart from direct war deaths the mortality has been light rather than heavy.

ESTIMATE OF THE EXCESS DEATHS IN THE WAR

9. Having dealt with the various points set out above and their possible effect on the deaths, we can now give an estimate of the total excess of war deaths.

Clearly, all the direct war deaths must be counted, and to this must be added any increase in the deaths due to other causes. The number of deaths from other causes for the period September 1939 to September 1945 is shown at the end of paragraph 2 to have been 6388.

The average yearly number of deaths for the six years 1933–8 was 814, or we might make the figure a little higher by including the experience for the first eight months of 1939. The number we should expect for the six years of war would be about 5000 if the pre-war census figure be taken in full, or 4500 if the pre-war census figure be reduced by 10%. There is therefore an excess of 1388 or 1888, according to the view taken as to the correct war-time census figure. If we had used the four years 1935–38 for estimating the pre-war deaths, we should have reached an excess of 1184 or 1704.

Adding these figures to the (28,230) direct war deaths we reach totals lying between 29,414 and 30,118 as our estimates of the effect of the war on the mortality of merchant seamen. This is an understatement so far as it excludes

deaths in the United Kingdom from wounds. It may also understate the increase in deaths from other causes if the number of men who ceased to follow their calling owing to ill health is greater than in peace-time or if the state of ill health is more serious.

Before proceeding further, it may be explained that the increase in deaths from causes other than enemy action has been due largely, but not entirely, to an increase in accidents. The deaths from accidents recorded by the Board of Trade for 1937 and 1938 were about 280 a year. So that in the six years of war we should expect about 1680 deaths from accidents if the population remained the same, or 1512 if we allow for a 10% decrease in population. The total accident deaths in the war were, however, 2488, showing an increase of deaths from accident of 808 or 976. As these figures are less than those given for the excess deaths from all causes other than enemy action, there must have been an increase in deaths due to disease.

ESTIMATE OF THE EXCESS DEATH-RATE

10. The next step is to express these excess deaths as an increase in the death-rate, where 'death-rate' means the ratio of deaths in a year to the appropriate population.

The census figure gives the average number of seamen 'at sea'* at any time, and the excess deaths of, say, 30,000 are the corresponding deaths that occur; the ratio gives the excess death-rate merely among those 'at sea' and, so long as this is borne in mind, there is no danger in using the result, but we must be careful not to infer that this is the excess rate of mortality applicable to the total number of seamen required to serve our Merchant Navy, which we will call 'serving seamen'. Such an inference would be correct only if the excess deaths in the United Kingdom, which are excluded, bear the same ratio to the excess of the population of serving seamen over the census figure, and it is most unlikely that this would be the case. We may, however, fix limits within which the death-rates of serving seamen have been increased, but to do this we must form an opinion of the total population of serving seamen. Various estimates of this population have been made by the Registrar-General of Shipping and Seamen during the war and by the Board of Trade before the war, as exemplified in Table 3. A careful estimate was made as at 30 September 1944, based on National Service Registration, adjusted to allow for those who would not be registered, and a figure of between 150,000 and 155,000 was obtained. This was checked by other methods. These figures included some 2000 in training schools who were not actually seamen, and nearly 12,000 in the Merchant Marine Pool, some of whom were known to be sick, and various miscellaneous classes, so to some extent they overstate the total for our present purpose. The tonnage in use in September 1944 to which the crews should be related was about 5% greater than the average amount during the war, so we should also reduce the figures to this extent. Allowing for all these

* The census figure does not include persons ashore in the United Kingdom at the time of the census; the deaths exclude deaths that occurred ashore in the United Kingdom. The term 'at sea' is defined in Appendix (*b*) as meaning 'between the time of leaving the shore of the United Kingdom and the time of again landing ashore in the United Kingdom provided the person remains a seaman'. A man would remain a seaman if ashore abroad or in hospital abroad, but not if he left his ship at a foreign port to take up other employment.

points, I do not think the average population of serving seamen during the war can be taken for our present purpose above 145,000. To this must be added a somewhat uncertain figure for Lascars, and we then reach a total of 180,000–190,000.*

The average of the two census figures for 1937 and 1938 including Lascars was about 160,000, and if we allow a 10% decrease we reach about 144,000 as an estimate of the average number of merchant seamen 'at sea'. The average annual excess deaths over six years of war are, subject to the various points already discussed, about 5000, and this would betoken an extra death-rate of 3·4% on a population of 144,000, or 2·7% if we use a population of between 180,000 and 190,000. The higher figure (3·4%) gives the extra death-rate among the number of seamen who may be regarded as 'at sea'; the lower figure (2·7%) distributes the extra deaths over the whole group of serving seamen and underestimates because excess deaths due to the war occurred ashore in the United Kingdom, but as we do not know how many there were we cannot say by how much the 2·7% should be increased and can only conclude that the excess death-rate of serving seamen exceeded 2·7% and was less than 3·4%. If the extra war deaths ashore in the United Kingdom were 1000, which seems possible from the figures in Appendix (*a*), these percentages would each be increased by 0·1.

11. This, however, is not the whole story. It will be noticed that the proportion of Lascar deaths from enemy action was about 17½% of the whole, whereas the proportion of Lascars in the population was about 22%, so that the British seamen had a higher excess death-rate than appears from the excess death-rate for the whole.

It must also be borne in mind that by using the six years September 1939 to September 1945 we are merely giving an average for that period, and an examination of Table 1 shows that this obscures the very heavy extra mortality in 1941, 1942 and 1943. Taking those three years together the average annual excess number of deaths was over 7500, or 50% greater than the average for the six years, and at a time when the tonnage and therefore the man-power was at its lowest. Instead of having such rates of excess mortality as 3·4% and 2·7%, we should find for those years rates of about 5% and 4%.

Another way of appreciating the magnitude of the increase in mortality is to compare the average peace-time deaths that occurred in the Merchant Service, i.e. 814 for the years 1933–38, with those in the war, neglecting the minor adjustments as to population. The average annual number of deaths in the six years of war was 5770, or seven times as many; the average number in the three years 1941, 1942 and 1943 was over 8000, or ten times the peace-time average.

12. Attention has been drawn to the increase during the war in 'deaths from other causes', and it was found that the main reason was a considerable increase in accidents to ships or individuals—an increase that must be attributable to war-time conditions. Even if these accidents had accounted to all intents and purposes for the increase in deaths from other causes, there might yet have been an additional wastage from disease or accident not shown by the statistics of deaths because they do not include deaths after

* The total excess deaths of 30,000 (or average of 5000 a year) include deaths as prisoners of war, and the population must therefore include an allowance for prisoners. The number of prisoners increased as the war progressed. The maximum was about 3500, of which about 1000 were in the Far East. The average over the six years of war can be put at about 1750.

discharge; and, even if we could obtain these deaths with reasonable accuracy, we should not know the number of persons among whom the deaths occurred. Although there is no peace-time information about the number of men who leave the Merchant Service or their state of health when they do so, we can give some information about the wastage during war-time. Since the Merchant Service Reserve Pool was set up in 1941, statistical information has been available and has become increasingly accurate. Apart from keeping a record of the number of seamen in each grade in the Pool, returns were prepared monthly showing the discharges, distinguishing between those that occurred for physical and non-physical reasons and giving subdivisions.

DISCHARGES FOR NON-PHYSICAL REASONS

13. Table 4 gives the average monthly discharges for the reasons indicated, and it may be mentioned that in some categories the numbers varied much from month to month. This applies particularly to those released on grounds of redundancy, which were over 100 in May 1945 and almost negligible between August 1943 and June 1944. The increase in the numbers discharged for misconduct may be due in part to definition, but is mainly because, in times of shortage, border-line cases are kept in service, an explanation which helps to account for some other variations. In addition to the discharges shown in the table, about thirty a month retired on account of age.

Table 4. Average monthly discharges from the Merchant Navy Reserve Pool for non-physical reasons

	End of war service	Redundant	Misconduct	Unsuitable	Compassionate grounds	Untraced absentees	Other*	Total
1943	—	35	90		10	33	122	290
1944	—	19	85	66	15	48	82	315
1945 to Aug. incl.	153†	41	201	52	25	43	152	667

* Mainly releases to Armed Forces and other occupations such as building, fishing, mining, etc.

† These all occurred in June, July and August.

It should be borne in mind that during the war our tonnage included shipping that we had captured. We were responsible for the manning of these ships, but the Danish vessels and French vessels coming in the category of British flag tonnage were very largely manned by Danes and Frenchmen. These men for the time being were seamen on British ships and they are included in our statistics of deaths and population, but when the war with Germany ended the shipping was gradually transferred to its own flag and the Danes and Frenchmen left our service. The 'other' item in Table 4 includes seamen repatriated to various countries, but does not include those in or transferred to the Free French National Pool.

DISCHARGES FOR PHYSICAL REASONS

14. We can now turn to the discharges for physical reasons. The particulars available were tabulated each month according to the nature of the physical defects or illness as stated by the medical examiners, and Table 5 gives the

average monthly discharges. There was a change in the classification in December 1944. The two classifications are set out in Appendix (*f*), and the grouping shown in Table 5 gives as fair a comparison as is practicable, but in some of the groups there may be marginal deviations owing to the change.

It will be seen that the rate of discharge has been high, approximating on average to 7500 a year, but some of the defects, while making the man unsuitable for employment at sea, would have been ignored in many other occupations. This applies particularly to the ear and eye groups, which were mainly comprised of men with defective hearing or vision, to the hernia group, and to the veins group, which related almost entirely to varicose veins. The large number of discharges for nervous disorders and digestive troubles of one kind or another are due to some extent to the nervous strain to which seamen have been exposed during the war.

Table 5. Average monthly discharges from the Merchant Navy Reserve Pool for various physical reasons

Period	T.B.	Disease of respiratory system	Ear and nose	Eyes and visual defect	Heart and blood pressure, etc.	Digestive disorders	Nervous disorders	S t
1943	26	35	26	28	35	57	83	2
1944	37	46	45	46	37	105	146	4
1945 to Aug.	32	49	57	64	45	119	161	5

Period	Rheumatism, etc.	Fractures, deformities, etc.	Hernia	Veins, varicose, etc.	Skin, etc.	Miscellaneous	Total
1943	18	42	10	15	13	79	467
1944	28	61	12	17	16	64	660
1945 to Aug.	44	40	12	23	22	100	768

Notes: Digestive disorders include gastric, duodenal and peptic ulcers and other diseases of the digestive system.
Nervous disorders include psycho-neurosis, mental diseases and organic diseases of the nervous system.
Fractures, deformities, etc., include amputations, frost-bite, burns, dislocations.
The miscellaneous group includes tropical diseases, glands, bladder, cancer, paralysis, diabetes, kidney, poor physique and general debility, teeth, etc.

Attention may be drawn to the fact that the average rate of discharge has increased considerably, and that this increase is especially noticeable in certain groups. Though in the earliest period marginal defects may have had to be ignored because of a shortage in man-power, the main reason for the change was the growing determination to keep in the Service only those who were fully fit for it.

DISCUSSION OF TWO SAMPLES OF MEN DISCHARGED FOR PHYSICAL REASONS

15. Though many of the men discharged would be fit for some occupation ashore, either immediately or after a few months, there is a considerable proportion that consists of permanently damaged lives and some who can have

had only a few months to live. From the tabulated material it could be said that probably over 60% of the men discharged in 1943 for physical reasons and about 40% of those discharged in 1945 would be regarded by a life assurance company as uninsurable or insurable only on special terms. This was confirmed by looking through certain sets of the actual medical returns, but, though this statement gives a general idea of the condition on discharge, it seemed advisable to make a more extensive investigation and the medical reports for 1304 discharges from the end of February 1944 to the middle of May 1944 were analysed. The result is given in Table 6, where the classification is according to the first cause given in the medical report. Thus there may be discrepancies where two or more conditions are stated, as a case might, for example, be described by one doctor as suffering from nervous debility and myocarditis and a similar case by another doctor as myocarditis and nervous debility. One would appear under 'nervous and mental conditions' and the other under 'heart'.

At the foot of the table the normal age distribution of merchant seamen is shown: it is based on the samples already mentioned.

16. The following points may be made on the various items in the table:

Nervous and mental conditions. The age distribution differs little from that of the general population of seamen.

Stomach and duodenum. Cases certified by one doctor as ulcers may be described by another as duodenitis or gastritis. Out of the 170 ulcer cases, 125 had been confirmed by X-rays or by operation or a strong pointer had been given by haematemesis. Hence forty-five of the ulcer cases might have been included in 'other gastric conditions' if a definite diagnosis had not appeared in the report. The age-groups 26–30 and 31–40 predominate.

Chest. The 'other tuberculosis' cases have been shown here so that the total tuberculosis can be easily seen. About half the cases of tuberculosis were over 30. The incidence of bronchitis increases with the age: asthma does not appear beyond the 31–40 age-group because 'bronchitis and asthma' as a diagnosis is classified under bronchitis.

Heart. The five cases in the 21–25 group under 'rheumatic disease' were all rheumatic endocarditis. 'Functional disorders' includes such vague conditions as V.D.H., heart strain and cardiac disease.

Rheumatism. Rheumatic endocarditis has been included under 'heart'. The arthritis section is confined to arthritis, rheumatoid- and osteo-arthritis, and osteitis. Cases of ankylosis and spondylitis are included under 'other'.

Eyes and ears. Probably several of these cases should never have been admitted to the Service; note particularly ten boys under 21 discharged for otitis media. The impression is that some wastage could have been avoided by a stricter initial examination of eyes and ears.

Urinary diseases. Includes nine cases at the younger ages of incontinence or enuresis (bed-wetting), which might have been eliminated if the facts had been obtained at the initial examination. There were fourteen cases of venereal disease, but these are only the cases severe enough for discharge. Two cases of tabes dorsalis are included under diseases of the nervous system.

Other causes. Seven cases of thyroid troubles look high. It seems unfortunate that epilepsy and petit mal were not discovered at an earlier stage.

A comparison of the totals in the age-groups with the normal age distribution indicates the general increase in risk of discharge for physical reasons as the age increases.

Table 6. Discharges from Merchant Navy. Analysis by cause of incapacity. Approximately March and April 1944

	Cause	Under 21	21–5	26–30	31–40	41–50	51–60	Over 60	Unknown	Total	
I.	Nervous and mental conditions										
	Organic nervous disease	—	—	—	—	3	2	—	3	8	239
	Functional nervous disorders	6	42	34	63	35	15	4	1	200	
	Mental history or symptoms	1	6	6	13	4	1	—	—	31	
II.	Stomach and duodenum										
	Duodenal, gastric or other ulcer	2	23	27	68	30	17	2	1	170	231
	Other gastric conditions	—	11	15	12	16	3	1	3	61	
III.	Chest										
	Pulmonary tuberculosis	4	16	6	18	6	4	—	1	55	162
	Other tuberculosis	—	—	1	3	—	—	—	—	4	
	Pleurisy	—	5	1	1	1	—	—	—	7	
	Bronchitis	4	1	8	20	21	16	6	2	78	
	Asthma	—	4	2	5	—	—	—	—	11	
	Other chest conditions	1	2	1	1	1	1	—	—	7	
IV.	Fractures, etc.										
	Skull	1	—	2	5	3	3	—	—	14	115
	Spine	—	1	3	2	4	2	—	—	12	
	Pelvis	—	—	1	2	1	—	—	—	4	
	Femur and hip	—	2	1	2	3	—	1	—	9	
	Knee, leg and foot	1	11	5	8	4	2	2	—	33	
	Shoulder, arm and hand	—	8	6	15	4	4	1	—	38	
	Sundry	—	1	—	—	1	2	—	1	5	
V.	Heart										
	Rheumatic diseases	—	5	1	2	1	—	—	—	9	90
	Hyperpiesis and c.v. degen.	—	—	1	3	11	13	4	—	32	
	Functional disorders	4	5	2	4	9	16	9	—	49	
VI.	Rheumatic conditions										
	Arthritis	—	6	4	9	8	15	4	1	47	85
	Rheumatism and gout	—	—	1	2	3	2	—	—	8	
	Sciatica and lumbago	1	1	3	5	2	1	—	—	13	
	Old infantile paralysis	2	1	—	2	—	—	—	—	5	
	Other	—	1	2	3	4	1	1	—	12	
VII.	Ears										
	Otitis media	10	14	6	17	10	4	1	—	62	84
	Deafness	—	1	2	3	7	4	1	1	19	
	Sinusitis	—	—	1	2	—	—	—	—	3	
VIII.	Eyes										
	Defective vision	—	17	10	21	15	9	2	—	74	82
	Other conditions	—	4	—	1	2	1	—	—	8	
IX.	Urinary tract										
	Kidney and bladder	1	6	8	7	5	3	1	1	32	54
	Diabetes	—	—	1	1	1	2	—	—	5	
	Venereal disease	—	2	2	8	2	—	—	—	14	
	Other conditions	2	—	1	—	—	—	—	—	3	
X.	Epilepsy and petit mal	6	11	1	2	4	1	—	—	25	162
XI.	Hernia	2	1	4	4	5	4	2	1	23	
XII.	Skin diseases	—	5	4	7	6	—	—	—	22	
XIII.	Varicose veins	—	1	2	9	7	—	1	1	21	
XIV.	Flat feet and hallux valgus	—	—	2	6	2	1	—	—	11	
XV.	Haemorrhoids	—	—	—	4	5	—	—	—	9	
XVI.	Seasickness	2	6	—	1	—	—	—	—	9	
XVII.	Cancer	—	1	—	3	1	2	—	1	8	
XVIII.	Thyroid disease	—	2	1	1	2	1	—	—	7	
XIX.	Frost-bite	—	1	—	3	2	1	—	—	7	
XX.	Tropical diseases	—	1	1	2	1	—	—	1	6	
XXI.	Miscellaneous	3	4	3	2	—	2	—	—	14	
Total		53	229	182	371	252	155	43	19		1304
Normal age distribution		277	292	172	296	175	78	14			1304

17. When this investigation was made the opportunity was taken of seeing whether there was reasonable uniformity in examinations between one doctor and another, and an analysis was made of the cases examined by five doctors who had between them dealt with 939 of the 1304 cases discharged. Three of these doctors (at Liverpool, Glasgow and London) had been responsible for 791 cases. Most of the divergences had no statistical significance, and the conclusion was reached that there was no evidence of undue severity or leniency.

18. A second sample of 1550 cases in August, September and October 1944 was examined (see Table 7). The relative increase in the cases discharged because of ear and eye defects arose largely from one centre, where there may have been a change in standard. There was also an increase in the varicose veins and miscellaneous groups. In this second sample the rheumatic heart disease cases were not separated.

TOTAL DISCHARGES

19. It will have been seen from Tables 4 and 5 that the total number of discharges and retirements from the Pool were nearly 10,000 in 1943 and nearly 12,000 in 1944, and that the rate of discharge was still greater in 1945, but this was partly because of the end of the war. As the Pool did not include Lascars, these discharges and retirements represent a total withdrawal rate of over 7% per annum, or, if we bring in the deaths, a wastage rate of over 10% per annum. This is a very high rate and shows that heavy recruitment was necessary and that the population of merchant seamen was a shifting one during the war in spite of the restrictions imposed by the Essential Works Orders. In peace-time, no doubt, many of those who join the Merchant Service leave it for work ashore, and if the Pool continues in some modified form it will be interesting to watch the peace-time changes.

CAUSES OF AND AGES AT DEATH

20. In view of the increase in deaths from other causes and the large number of discharges from the Pool for physical reasons, it seemed worth while to attempt an analysis of causes of death from disease during the war to see if they gave evidence of increase in mortality from certain diseases. To this end full particulars were taken out in respect of deaths from causes other than enemy action for every fifth month from February 1940 to September 1944 (twelve months in all). These statements were examined, and it was found that the proportionate numbers of deaths from pneumonia, from tuberculosis and lung trouble and from ulcers showed no statistically significant variation from the proportionate deaths from those causes in peace-time. These groups are fairly well defined, but the 'heart' group, which showed an apparent increase in deaths, was unsatisfactory, as it included many such vague descriptions as 'presumed heart attack', 'heart failure', 'cardiac failure', 'heart collapse', 'sudden heart failure', and these causes appeared, when the age at death was under or just over 30, far more frequently than seems probable. This is no doubt due to there having been no medical man in attendance, and similar poor descriptions would also occur in peace-time. We found over 110 cases among non-Lascars in this group, whereas judging by the *Return of Shipping Casualties and Deaths* for 1937 we should have expected about sixty. The

Table 7. Discharges from Merchant Navy Pool. Analysis by cause of incapacity August, September and October 1944

	Cause	Under 21	21–5	26–30	31–40	41–50	51–60	Over 60	Un-known	Total	
I.	Nervous and mental conditions										
	Organic nervous disease	—	1	1	—	3	4	1	—	10	276
	Functional nervous disorders	15	63	42	67	39	15	—	5	246	
	Mental history or symptoms	1	8	1	7	2	—	1	—	20	
II.	Stomach and duodenum										
	Duodenal, gastric or other ulcer	3	25	32	71	32	7	2	3	175	246
	Other gastric conditions	6	4	9	29	15	6	2	—	71	
III.	Chest										
	Pulmonary tuberculosis	3	13	8	29	9	3	—	2	67	170
	Other tuberculosis	1	—	—	—	—	—	—	—	1	
	Pleurisy	3	3	—	2	1	—	—	—	9	
	Bronchitis	1	4	5	22	13	12	2	—	59	
	Asthma	2	3	1	4	4	1	—	—	15	
	Other chest conditions	—	3	1	10	3	2	—	—	19	
IV.	Fractures										
	Skull	—	2	3	4	2	—	—	—	11	120
	Spine	1	2	1	3	2	—	—	—	9	
	Pelvis	—	1	—	1	1	—	—	—	3	
	Femur and hip	—	2	—	3	3	—	—	—	8	
	Knee, leg and foot	—	10	2	12	5	3	2	1	35	
	Shoulder, arm and hand	2	8	7	13	8	3	—	—	41	
	Sundry	1	4	3	3	2	—	—	—	13	
V.	Heart										
	Organic disease	3	10	2	9	12	11	3	2	52	103
	Functional disorders	4	4	7	10	9	10	7	—	51	
VI.	Rheumatic conditions										
	Arthritis	—	4	3	12	10	5		—	35	95
	Rheumatism	1	3	2	7	9	—	—	—	22	
	Sciatica and lumbago	1	1	2	5	6	1		—	17	
	Old infantile paralysis	—	4	1	1	1	—	—	—	7	
	Other	—	3	4	4	2	1	—	—	14	
VII.	Ears										
	Otitis media	16	38	21	29	6	2		1	114	137
	Deafness	2	6	—	3	5	—		—	17	
	Sinusitis	1	—	1	4	—	—	—	—	6	
VIII.	Eyes										
	Defective vision	14	24	23	24	14	6		1	110	121
	Other conditions	—	3	2	3	2	—		—	11	
IX.	Urinary tract										
	Kidney and bladder	2	13	4	15	5	2	3	—	44	64
	Diabetes	—	2	1	1	—	—	—	—	4	
	Venereal disease	—	1	1	7	4	—	—	—	13	
	Other conditions	1	1	—	—	1	—	—	—	3	
X.	Epilepsy and petit mal	3	16	5	9	2	1	—	1	37	218
XI.	Hernia	—	1	4	2	7	1	4	—	19	
XII.	Skin diseases	2	3	6	11	5	2	1	—	30	
XIII.	Varicose veins	1	7	8	14	8	6	1	—	45	
XIV.	Flat feet and hallux valgus	2	4	3	6	2	1	—	—	18	
XV.	Haemorrhoids	—	1	—	5	2	1	—	—	9	
XVI.	Seasickness	1	1	2	1	1	—	—	—	6	
XVII.	Cancer	—	—	1	—	1	1	—	—	3	
XVIII.	Thyroid disease	—	3	2	3	1	—	—	—	9	
XIX.	Frost-bite	—	2	1	1	—	—	—	—	4	
XX.	Tropical diseases	—	2	—	2	3	—	—	—	7	
XXI.	Miscellaneous	3	6	4	8	3	3	4	—	31	
Total		96	319	226	476	265	110	42	16		1550
Normal age distribution		328	347	205	352	208	93	17			1550

1937 report, however, shows forty-three cases as 'causes ill-defined or unknown', and it is possible that this description covers many cases in which such vague descriptions as those mentioned appeared as the cause. If this is so, there is no reason to infer that diseases of the heart were proportionately greater in war-time than in peace-time. No valuable inference can be drawn from this investigation into causes of deaths, and I am doubtful, after an examination of the information furnished, if we shall ever be able to draw satisfactory conclusions when many of the causes are given, necessarily, by laymen.

Though I have been unable to find much evidence of a change in the incidence of deaths from particular causes, there must have been some general increase during the war in deaths from disease, as accidents do not fully explain the increase in deaths from causes other than enemy action.

It may be mentioned that there was no increase in deaths from suicide which amounted to about twenty-four a year. There were nearly as many cases where the cause of death can be described as 'disappeared', and in some of them it is possible that the man committed suicide, but no reasonable allowance for this would lead us to suppose that suicides increased during the war.

21. In order to reduce the work and simplify the presentation of the results, no attempt has been made to separate the experience of officers, engineers, etc., from that of ordinary seamen. The deaths from enemy action, most of which resulted from the loss of the ship, far exceed the remainder, and it is unlikely that significant differences would be found. Similarly, no examination of the ages at death from enemy action has been undertaken, but the following information was obtained from the statements of deaths from other causes mentioned in paragraph 20.

Table 8

	Age-group					
	Under 20	20–	30–	40–	50–	60–
Deaths from accident:						
Non-Lascars	56	161	132	88	61	30
Lascars	3	11	24	11	9	2
Deaths from other causes:						
Non-Lascars	17	53	69	89	90	53
Lascars	—	28	38	48	53	7

The average age at death from accident was slightly under 36 for non-Lascars and 38 for Lascars: the average ages at death from other causes were 45 and 43 for non-Lascars and Lascars respectively. The average age of British seamen was 36 at the beginning of the war and about 32 in 1945, when the two samples of 500 were taken: an average age at death from accident (other than enemy action) of under 36 indicates that the risk of death from these accidents increases only slightly with the age.

The ages at death were given for Lascars with few exceptions, and, as the accident death risk is but little associated with the age, the age distribution of Lascars in Table 8 gives a rough idea of the age distribution of Lascars in the Service.

COMPARISON WITH FIGHTING SERVICES

22. A paper giving the *Strength and Casualties of the Armed Forces and Auxiliary Services of the United Kingdom*, 1939–1945 (Cmd. 6832) was issued in June 1946, and it may be thought that a comparison of the death-rate of the Merchant Service with the death-rates of the fighting services would be a simple exercise. The figures for war casualties given in the official paper for the Merchant Service differ from those given in my paper mainly because the fishing fleet is included. We could, however, make use of the death-rates we have already discussed if we were satisfied that we should be making a reasonable comparison.

In Table 9 I have given an estimate of the average strength of the Armed Forces based on Table 1 of the official paper and the average yearly numbers killed, which include those who died from wounds and injuries, those presumed dead and those who died in captivity (see Table 5 of official paper). The death-rates from tl se figures are given, and I have also shown the figures for deaths from n :ural causes (footnote to p. 6 of official paper).

Table 9

Service	Assum averag strength thousan ;	Average annual war deaths in thousands	Rate % p.a. of war deaths to strength	Average annual deaths by natural causes in thousands	Rate % p.a. of deaths by natural causes to strength
Royal Navy	550	8·5*	1·55*	1·2	·21
Army	2400	24·0	1·00	3·3	·14
Royal Air Force	775	11·6†	1·50†	7	·09

* Including deaths from disease attributable to war service.
† Including suicides.

It will be seen that the death-rates are appreciably less than those given by the experience of the Merchant Service, but comparison is difficult because in the fighting services there is a substantial number of men who are engaged in administrative, hospital, etc., work at home and abroad to which there is no counterpart in the Merchant Service. There is the further difficulty that a man in one of the fighting services dying in the United Kingdom as a result of wounds or illness would be included in the returns so long as he was retained in the service, whereas similar cases do not appear in the statistics for the Merchant Service. Again, as between the three fighting services themselves, the tabulation is not uniform (see note to Table 9), and even if this were adjusted, the comparison would not be of like things if the period of retention in the three services after injury or illness differed materially. Another point that may be mentioned is that within a fighting service there must, I think, be a wider range of risk than in the Merchant Service. The risk to merchant seamen was greater in the Malta convoys, in the Russian convoys and at times in the Atlantic than on the longer routes, but the variations could hardly be compared with those in, say, the Air Force between bomber or fighter crews on the one hand and ground staff on the other. As regards the deaths from 'natural causes' the variations shown in Table 9 must I think be due, mainly, to differing age incidence in the three populations, though differing stringency

in accepting men for service or in discharging men who are unfit may have had an influence.

I do not think, therefore, that at the present time the published statistics justify comparisons, nor do I think it likely that statistics could emerge to make comparative work reliable, but, more to warn people against such attempts than to rank the risk, I may indicate how the Royal Navy casualties and strength would have to be modified to render a comparison with the Merchant Service more reasonable. We ought first to separate from the Royal Navy war deaths (1) deaths from disease attributable to war service and (2) deaths occurring in the United Kingdom from wounds, and we should then reduce the figure for the strength by deducting the average number of men in the Royal Navy who were stationed in the United Kingdom or elsewhere on administrative, hospital, etc. duties and the average number of men who were on leave in the United Kingdom or in hospitals. Though these seem to be the more important adjustments, I must confess that I should want to make further inquiries before indulging in a comparison. The reader will, I hope, see that it is impracticable to set out the relative risks run by men of the Royal Navy and by men of the Merchant Service from the statistics available.

CONCLUSION

23. The paper gives figures of the deaths and illnesses of merchant seamen during the war; it shows that the death-rates were high, especially during the middle period of the war, that the discharges from the Service were heavy and that many men left the Service in distinctly poor health. It needs little imagination to see behind the mere statistics the magnitude of the risks run and the courage that enabled the men of the Merchant Service to carry out their work. Without that, all would have been lost.

APPENDIX

(*a*) *Deaths as returned by the Registrar-General of Shipping and Seamen, Board of Trade and Admiralty*

The *Return of Shipping Casualties and Deaths*, published in peace-time by the Board of Trade, gives figures that differ from those in Table 1. The following is a comparison:

	Registrar-General of Shipping and Seamen	Board of Trade
1933–36 (average)	762	778
1937	842	871
1938	996	908

The Board of Trade figures relate to deaths in the calendar year, so far, of course, as they were known when the statements were prepared, whereas the figures of the Registrar-General of Shipping and Seamen relate to deaths reported and recorded in the year (see also Appendix (*e*)). As there is an average delay of two months in notification of deaths in peace-time and as the delay

sometimes runs to many months and occasionally to years, tabulation according to the year in which deaths are recorded seems the simpler plan. It will not lead to incorrect conclusions as the lag is about the same at the beginning and end of a year or longer period. In war-time, delays in notification have been somewhat greater than in peace-time.

The Board of Trade figures were not prepared by the Registrar-General of Shipping and Seamen but were made up from records kept by the Marine Department of the Board of Trade. This Department became part of the Ministry of Shipping, and later of the Ministry of War Transport. The Registrar-General of Shipping and Seamen took over the work in 1941. The non-statutory record was discontinued.

Higher figures than those appearing in or implied by Table 1 have been given in statements made in the House of Commons and elsewhere of the deaths of merchant seamen from enemy action. The reason for the apparent discrepancy is that these statements included deaths in the fishing fleet (as in Cmd. 6832) or deaths that are omitted from Table 1 because their inclusion would vitiate comparison with peace-time, or because the population to which the omitted deaths related was unknown, or because the individuals were not, strictly speaking, in the Merchant Navy at the time of death. The following additional figures may be given as of interest, but they must not be added to the figures in Table 1 and then related to the population figures given in the report. Nor must they be regarded as conforming to the same definition of merchant seamen as is implied by the peace-time figures.

Deaths, mainly in Far East, in British vessels, for which returns are not made to the Registrar-General of Shipping and Seamen, estimated from tonnage of ships known to be lost (see paragraph 2 (iv)).		Part, possibly small part, of 4537 missing
Deaths among men on D.E.M.S. (defensively equipped merchant ships). These were men in the Army or Navy, but because they were on merchant ships they signed articles.		2465
Deaths among those under T. 124, etc., articles (technically they were in the Royal Navy):		
Killed and missing presumed killed	1225	1225 to 1489
Natural causes, suicide and murder	153	
Accidental death	68	
Drowned (accidental)	43	
Deaths in the United Kingdom from wounds or from such illnesses as were regarded as consequent on the war (information received from Ministry of Pensions as to deaths included in reports for the first time up to December 1945 inclusive).		1078

(b) Relation of deaths to population for estimating occupational mortality

The inherent difficulty in dealing with occupational mortality is that men change their occupations, so a man may become a damaged life in one occupation, leave it and die as something else. He is then counted as a death among

those of his final occupation, though his death may have been caused or accelerated by an earlier occupation. Men are only employed if they are fit to undertake the particular work and, consequently, in many occupations which require fitness the mortality among 'actives' is light, even though the occupation may be hazardous because the unfit cease to be engaged in those occupations. This must be borne in mind in any study of occupational mortality and it is, in general, impossible to measure statistically the total effect of an occupation on mortality, and we have to be content with measuring the mortality of 'actives'.

It is essential that the records of deaths and the records of the populations with which they are compared are subject to like definition. The rule must be observed that no man's death is included unless he would have been counted in a census of living if one had been taken the moment before his death occurred and, similarly, everyone must be counted in the census who would have been counted as a death if he had died the moment after the census is taken, and no one else may be counted. Within the definition adopted for any group of lives we can then properly relate deaths to population and give death-rates that have an exact meaning within the limits of the definition.

In the case of merchant seamen the Registrar-General of Shipping and Seamen can record deaths 'at sea', where 'at sea' is taken to mean 'between the time of leaving the shore of the United Kingdom and the time of again landing ashore in the United Kingdom provided the person remains a seaman (i.e. does not leave the ship at a foreign port to take another job)'. The population with which these deaths can be compared to give death-rates of merchant seamen 'at sea' must be based on a census giving the total of seamen by the same definition. Thus the deaths in the form given in Table 1 (peace years) can properly be related to the census figures in the *Census of Seamen* on 15 June of that year.

In successive periods we can give comparisons which will show changes of mortality of merchant seamen 'at sea'. A decrease in the death-rates may not be due merely to improvement in conditions or a decrease in hazard, but may be affected by the relative time spent 'at sea'. In interpreting change, such possibilities will have to be considered.

Admittedly we should like to give also a measure of mortality of merchant seamen with a wider definition than the one which we have set out, but we cannot do so because we cannot get both the deaths and the populations which would be necessary in such circumstances. Attempts have been made, but they are open to criticism, as those who have made them have pointed out. Thus, in Appendix A of the *Registrar-General's Decennial Supplement* (*England and Wales*), 1931, Part II *a*, *Occupational Mortality*, the deaths registered in England and Wales, Scotland, Isle of Man and Channel Islands, of persons described in death certificates as seamen (including retired) are added to the deaths 'at sea', and the number of people enumerated at the census of England and Wales as seamen (including retired) are added to the population of seamen 'at sea', and the two sets are then related to give death-rates. This is probably the best that can be done to estimate the mortality of British merchant seamen as a whole, but the *Supplement* specifically mentions the difficulties arising from changes of occupation and the possible tendency to state on death a previous occupation as mariner in preference to the last shown occupation. It is clear that those responsible for the work think that the results must be regarded with considerable reserve.

Another attempt was made by Major P. Granville Edge (*Statistics relating to Mortality in the Merchant Marine, Report of the London School of Hygiene and Tropical Medicine*, H.M.S.O., 1932) in which he related the deaths 'at sea' and ashore in a single year to the population of seamen in the *Census of Seamen* taken on 31 March 1930. This Report contains much valuable information, but so far as death-rates are concerned Edge pointed out that the population he used was too small—it included no estimate of the seamen ashore (including retired), though the deaths among these people were included.

In the Introduction to the annual *Return of Shipping Casualties and Deaths* produced by the Board of Trade, a figure is given of 'the approximate number of persons forming the first crews of sea-trading vessels actually employed' during the year and the figures are, of course, greater than those shown for the number of seamen in the *Census of Seamen* for the same year. Thus, for 1937 the first crew figure is 190,690, whereas the *Census* figure is 161,148. It would be wrong to use the higher figure as the denominator to obtain death-rates unless the deaths recorded are increased by the corresponding* deaths ashore, and though the first crew figure is a better estimate of the total of active merchant seamen on seagoing ships (of what is called 'serving seamen' in paragraph 10) it is perhaps likely to appear to be the appropriate denominator for calculating death-rates when it is given instead of the *Census* figure in such close proximity to the deaths (see also (*c*) below).

After careful consideration I have come to the conclusion that the best thing to do from the statistical point of view is to use the deaths and populations 'at sea', admitting that they can give only death-rates 'at sea'. In addition we can have for reference the figures obtained in the *Decennial Supplement*, but, in making use of them, their weaknesses must not be ignored.

(*c*) *Population of merchant seamen*

Paragraph 5 and Appendix (*b*) above refer to the estimate of first crews made by the Board of Trade. For purposes other than the study of mortality we may require to know the total number of active merchant seamen, i.e. the total number of seamen that are required to serve our fleet of merchant ships. Obviously this total exceeds the *Census* figure, because some ships are in dock or loading or unloading at United Kingdom ports and some merchant seamen are on leave or in hospital and are not therefore continuously engaged. The Board of Trade figure of first crews seems to ignore the fact that a seaman may not be on the same ship throughout the year, but there are offsets, and judging from estimates made during the war by other methods it gives a fair approximation.

(*d*) *Was the length of voyage in war-time greater than in peace-time, so that a seaman became less likely to die in the United Kingdom?*

(i) The European trade ceased after the fall of France, but the British shipping engaged in it was employed to a large extent in coastal work.

(ii) There was a reduction in the traffic from the United Kingdom to Australasia and the Pacific, and the long voyages to the Far East (China, Malaya, etc.) ceased after Japan entered the war.

* The word 'corresponding' is most important. It would be wrong to add to the deaths 'at sea' the deaths in the United Kingdom recorded by the Registrar-General of Births and Deaths as occurring among 'seamen' because these would relate to a large number of people who cannot be regarded as merchant seamen.

(iii) Long absence from the United Kingdom of tramps was reduced.

(iv) Owing to shortage of shipping there was considerable concentration of shipping on the Atlantic, which was one of the shortest possible voyages. During most of the war half our imports were carried on this route.

(v) The carriage of goods to and from India and Egypt via the Cape meant a considerable increase of time at sea.

(vi) Voyages took longer because of convoys, diverted routes, etc., but some of this meant waiting at the United Kingdom for convoys and if a man were taken seriously ill he would be sent ashore. Also some of the lengthening of voyages was due to semi-coastal work of ocean-going ships, which in a sense meant an additional short voyage and a sick man could be evacuated.

It is impossible to make an exact estimate of the average difference in length of voyage, but it will be seen that some of the changes would have decreased the proportionate time ashore in the United Kingdom and others would have increased it.

One other, though not an exact, test was tried. It is noticeable from peace-time casualties that the deaths from disease in fishing vessels were only about 15% of the total deaths in fishing vessels, whereas the deaths from disease in other vessels were 60% of the total deaths. This proportion gives some indication of length of voyage. The deaths from causes other than enemy action during the war for six years were subdivided into accidents and disease, and the proportion due to disease was about 50%, i.e. less than the peace-time proportion. This percentage, however, makes no allowance for the war-time increase in accidents, and if the excess deaths from accident are allowed for the proportion due to disease becomes little over 60%. This test does not indicate any material change.

(*e*) *Note on the Board of Trade 'Return of Shipping Casualties and Deaths'*

In Appendix (*a*) it is implied that the Board of Trade, in making this Return, would have dealt with deaths on the same principles as those followed by the Registrar-General of Shipping and Seamen. There is no statement of the exact basis and method of compilation in the Introductions to the Returns in recent years and one of the tables (no. VIII) gives 'Deaths after discharge'. The Registrar-General of Shipping and Seamen, though not responsible for the Return, understands that almost all the deaths shown in the table occurred abroad. It seems strange that a table giving 'Deaths after discharge' should include entries for 'killed on deck', 'fell down hatchway', 'fell overboard', etc.; possibly death had occurred ashore abroad after the man had had an accident on the ship and been discharged or had been discharged and had died subsequent to discharge but before actually leaving the ship.

(*f*) *Discharges from the Merchant Navy for physical reasons*

Latest classification	Earlier classification
Respiratory tuberculosis	Chest diseases (not T.B.)
Other tuberculosis	Tuberculosis
Syphilis (and sequelae)	Ulcerated legs
Gonorrhoea	Varicose veins
Scabies	Varicocele and genital organs
Malaria	Piles
Other tropical diseases	Hernia
Typhoid and paratyphoid fevers	Ear diseases, etc.
Dysentery	Eye diseases, etc.
Other infective and parasitic diseases	Heart diseases
Organic diseases of nervous system	Gastric diseases
Psychoneurosis and mental diseases	Nervous diseases
Diseases of eye—visual defects	Skin diseases
Diseases of ear and mastoid	Rheumatism
Diseases of heart and arteries	Fractures or deformities
Diseases of veins (varicose ulcers, haemorrhoids)	Injuries through enemy action
	Bladder diseases
Diseases of respiratory system	Spinal diseases
Diseases of mouth and teeth	Poor physique and general debility
Gastric and duodenal ulcers	Infectious diseases
Hernia	Amputations
Other diseases of digestive system	Chronic appendicitis
Genito-urinary diseases (non-venereal)	Kidney diseases
Diseases of skin and cellular tissues (excluding scabies)	Frostbite
	Burns
Rheumatism and diseases of bones, joints, muscles	Blood pressure
	Paralysis
Deformities	Pernicious anaemia
Other diseases and ill-defined symptoms	Glandular diseases
Burns	Chronic alcoholism
Fractures	Cancer
Dislocations and sprains	Diabetes
Other unspecified injuries	And certain other complaints were mentioned separately, such as:
	Post-concussion
	Jaundice
	Wasting muscles
	Tonsils
	Fistula
	Meningitis

ABSTRACT OF THE DISCUSSION

Sir William Elderton, in introducing the paper, said that since it had been written he had calculated an average age of those who were killed by enemy action for two specimen months about the middle of the war. He had found that the average age for non-Lascars was 32 and for Lascars about 38, which could be compared with Table 8.

No attempt had been made to compare death-rates among crews for different types of ships such as tankers, passenger vessels, tramps and so on. He had considered the point and came to the conclusion that anything he could do would be unreliable. The populations would be mere guesses, and the range of error would be far greater than that indicated for the population as a whole.

He had not touched on such problems as the probability of survival of members of the crew when a ship was hit, but he might mention that various devices were adopted during the war to increase the possibility of survival amongst those who went to sea. Some account of certain of those devices was given in the official publication *Merchantmen at War*, which contained much other information of which everybody should be aware.

Mr E. C. Layton, in opening the discussion, said that no one would be unaware of the inestimable part played by the Merchant Navy during the war or unappreciative of the persistence of the enemy's attempts to destroy that vital life-line. In a long struggle the cost to the Merchant Navy in ships and men had been very heavy indeed; it was comparable with the cost to the actual fighting services, and in fact in many ways it was greater.

He was associated with a pension fund created in 1938 for the benefit of officers in the Merchant Service. Unfortunately, during the war years the administration of the fund had experienced very acute staff difficulties and only very light statistical work had been attempted. Such as had since been done could not in any way be described as a final estimate, but might, however, be of some interest in connexion with the subject of the paper. When the scheme commenced, membership was made compulsory for all officers in the Merchant Navy who were not contributing to previously existing pension schemes conducted by shipping companies, and the membership comprised about 90% of the officer personnel. At first sight that section of the Merchant Navy seamen might be considered as a representative portion of the whole for purposes of comparison, but there were some important deviations.

Members who contributed through the Admiralty under T. 124 agreements were included, and corresponding deaths. That membership on the average represented about 5% of the total. It would be seen from the paper that if the number of deaths amongst those under T. 124 agreements was compared with the total number of Merchant Navy deaths, the proportion was about 4½%. Thus the inclusion of those members would not make any material difference to the result.

Members detained by the enemy were included, since their contributions were continued through the Ministry of Pensions, but all reported deaths among them were treated as war deaths. The proportion was small, and represented about 2% of the contributors from 1942 to the end of the German war, and none at all for the earlier years. Male staffs of national Merchant Navy undertakings employed ashore contributed, but there were only about a hundred of them, and the numbers were omitted from the estimate of population for the purposes of ascertaining war mortality. British officers serving in Colonial and foreign shipping companies registered abroad were included, with their corresponding deaths. There were also Allied officers serving in ships taken over by the Ministry of War Transport, but he noticed that an allowance for those had been made in the paper. Lastly, about 1% of the contributing members came from Eire. They entered the scheme on a compulsory basis, and possibly very slightly lightened the resulting experience.

One of the major difficulties during the war had been the registration of new members. Whenever the fund received a name and contribution without any other means of ascertaining whether the man had previously contributed or not, he was allocated a new number, and it was left for further correspondence and other means to attempt to find whether he was an existing member. There was, therefore, a considerable amount of duplication of membership for which he had had to make some allowance, which had been rather in the nature of guess-work.

The number of officers contributing increased during the war, owing primarily to the large increase in the number of radio officers. Before the war many ships had carried only one radio officer, but during the war the number was increased to two or more, usually three. That increase was largely responsible for reducing the average age among officers from 37 in 1938 to 33 in 1943, a reduction corresponding to that indicated in the paper, though the ages were one year older. Among ratings the reduction was perhaps more influenced by the calling-up of young men.

There was another difficulty, though a very minor one, arising from the fact that contributions paid to the fund were not always paid in the year in which they were due. That would only have effect if, during the year in which they were due, no other contributions had been paid.

The fund records were marked when deaths occurred from causes connected with the war; such deaths, in addition to those directly attributable to enemy action at sea, included deaths from war injuries on shore, deaths as the result of collisions between ships sailing in convoy and at night-time with no lighting or very inadequate lighting, deaths in circumstances directly attributable to 'black-out' conditions, and deaths resulting from the foundering of ships carrying war cargoes for which they were not constructed.

The data were still not complete, because some of the deaths had not been notified. Deaths were usually reported either by shipping companies or by the next of kin. There were about a hundred cases where there was no information as to the exact cause of death; most of those were probably war deaths. The number of deaths ascertained as being due to war causes, allocated to the year of death, and the ratio of the number of deaths to the average estimated membership in the year, were:

		%
1939	141	1·5
1940	1262	4·3
1941	1684	5·2
1942	1526	4·5
1943	875	2·4
1944	318	·8
1945	96	·3
Total	5902	

The average ratio for the whole war was very nearly 2·9%.

Those ratios possibly gave a more representative estimate of the incidence of war casualties than was obtainable from the Registrar-General's returns, where delayed notification seemed responsible for too heavy a total in 1943. For various reasons he had already mentioned it was probable that the fund's statistics erred slightly on the low side, but as they represented war risk in service they would naturally be rather less than the estimate of war risk at sea. If an allowance was made for unnotified deaths the average rate would probably work out at about 3%.

There was one point in the paper on which he hoped the author might be able to give some information, namely whether the Registrar-General's returns had been adjusted to allow for those reported missing and presumed drowned but afterwards found to be prisoners of war. In the fund there were a considerable number of such cases.

The statistics of the fund showed no significant increase in deaths from accident, apart from those caused by fluctuations due to the incidence of shipwrecks attributable

to normal marine hazards. The normal death ratio, which increased very slightly after 1938, tailed off somewhat after 1942.

In the paper the author had expressed some doubt about using a smaller population than the pre-war one for his calculation. Personally, his first reaction to that reduction was one of considerable misgiving, especially when he looked at the figures of the fund he had mentioned; but it should be remembered that even if the average pre-war population at sea were used, without adjustment for the probable longer time spent ashore during the war, the war death-rate would still be about 3·1 %.

The average 'population' for the fund, excluding those under T. 124 agreements, was:

1938	26,500
1939	27,400
1940	27,400
1941	30,300
1942	32,000
1943	33,500
1944	35,800
1945	36,600

The average for the whole war was 32,000. The major factor responsible for the increase in population was the increase in the number of radio officers carried. The total increase in radio officers, so far as he could estimate it, was about 6000, and the average increase during the whole of the war about 5000. If radio officers were excluded, the average population of the fund would be reduced to its pre-war level or a little less. Making allowance also for the inclusion of prisoners of war, there was an indication that the population at sea was slightly less on the average during than before the war.

Undoubtedly the war was to some extent responsible for the very large number of discharges for nervous and mental conditions, fractures, and several other miscellaneous conditions such as frost-bite (probably due to the Arctic convoys), as shown in Tables 6 and 7. How far discharges from other causes had been affected by war-time service it was impossible to state without statistics of discharges during peace-time. In an effort to examine the problem a little further, statistics from the fund he had mentioned had been examined, the data selected relating to withdrawals on account of disability. A member who withdrew on account of disability was entitled to apply for the return of his own contributions twelve months after ceasing to contribute. During the war every applicant had had to submit a medical certificate showing the nature of his impairment, as well as the discharge certificate handed to him by the Merchant Navy Reserve Pool which very rarely gave any indication of the actual cause of discharge apart from stating that the officer was physically unfit for further service. The medical certificates showed the position roughly twelve months after a member had been discharged. Of claims during 1945, covering 441 cases, the percentages, classified under the main headings shown in Tables 6 and 7, were:

	%
Nervous and mental conditions	19·7
Stomach and duodenum	15·0
Chest	12·2
Fractures	10·2
Heart	11·8
Rheumatic conditions	6·6
Ears	3·4
Eyes	7·2
Urinary tract	3·0
Remainder	10·9

Of those classified under 'fractures', over 50 % were reported by the examining medical attendant as being due to war causes, and in several cases discharges for eye and ear conditions were similarly certified. He did not know whether officers blinded during the war were included by the author under heading VIII.

In the analysis of the fund's statistics, the claims from nervous conditions were distributed by age similarly to the figures given in the paper. There was an increase in the number of certifications from heart trouble at the later ages when members were applying for retirement grants. It should, however, be emphasized that it was impossible to reach any definite conclusions from the statistics. It was to be hoped that further information would in due course be available about the medical discharges from the Merchant Navy.

Sir William Currie (a visitor) remarked that the paper was most interesting to those who were connected with the sea. Because of his interest in Indian seamen, he wished in particular to draw attention to the proportion of deaths of Indian seamen out of the total number of deaths from enemy action and other causes as shown on p. 252—6250 Indians out of 34,618, or about 18%. On a rough estimate, it was usual to calculate that in the Mercantile Marine one-third of the seamen were Indians. In paragraph 11 the proportion was put at 22%, and in Table 3 it was shown in 1938 to have been over 25%, but the proportion of deaths was only 18%. Why that should be so it was difficult to say; perhaps the fact that there were fewer Indian seamen in the Atlantic convoys, and none in the Archangel convoys, might account for it. Another reason might be that many Indian seamen were employed in Eastern waters, which the war did not reach until Japan entered.

With regard to the average age of seamen, so many old seamen came back to the Merchant Navy during the war that the average age might have been expected to be higher than before the war, but the figures showed that it was lower. That was also the experience of the P. and O. Line for British seamen; but their experience was small, because their deck and engine-room crews were Indian, and only half their saloon crews were British, the other half being Indian or Goanese.

Paragraph 19, dealing with wastage, was one of the most striking in the paper. Wastage was at the rate of over 10% per annum, and worked out at 10,000 in 1943 and 12,000 in 1944. He well remembered that, when working in the Ministry at the time that Sir William Elderton was there, the figures they used to see rather frightened them. To judge by Tables 5, 6 and 7, the principal reasons for the wastage, apart from actual deaths from enemy action, would seem to have been digestive and nervous disorders. (The latter would affect the former.) That was not to be wondered at, for not only were the seamen working at concert pitch for the safety of the ship, passengers and cargo, but they had the added burden of wondering what was happening to their families at home, for the wireless silence prevented any news reaching them.

He had often wondered how far the 'black-out' was responsible for chest troubles, apart from increased strain. It was difficult to imagine anything more nearly approaching Hades than the engine-room of a coal-burning ship in Eastern waters under 'black-out' conditions.

The P. and O. figures showed that the health of their crews was improving, and that the percentage of rejection of new applicants was becoming much smaller. During the war their figures had not varied much. Working days lost owing to sickness and injury, but not enemy action, as a percentage of crew-days, including Indians, were:

	%
1942–43	·445
1943–44	·499
1944–45	·448
1945–46	·461

The deaths, including Indians, per 1000 strength, were:

1943–44	3·20
1944–45	2·35
1945–46	3·02

Those figures compared with an average for the five pre-war years of 2·74, and did not include deaths from enemy action.

He apologized for giving the figures of an individual company, but sometimes it was useful and interesting to see how over-all statistics compared with an individual experience. Speaking for all shipowners, he would like to say how very much they agreed with the last two sentences of the Conclusion to the paper.

Dr E. L. Caldwell-Smith (a visitor) said there would be general recognition of the difficulty of the task that Sir William Elderton must have had in getting his figures together, because undoubtedly one of the best-kept secrets of the war was the population of the Merchant Navy; nobody knew it. It was not really known before the war, and the way in which Sir William had been able to produce his figures was marvellous.

One aspect not dealt with in the paper was the fact that during the war there was a tremendous increase in coal-burning vessels. There were fewer men on the passenger liners, but the crews of cargo vessels were much increased by extra manning on deck and in the engine-room, and the number of firemen increased considerably.

A point of interest in the author's analysis was the question of the increased mortality which was not due to enemy action. There had undoubtedly been an increase. On the basis of the figures given in the paper, it would seem that in 1937 and 1938 the average number of deaths due to illness was 639, while for the six war years it was 650. That was an increase of only 11 per year, and, considering the conditions under which the Merchant Navy had to carry on during the war, he was surprised that it was not higher.

Another point of interest was the length of time which merchant seamen spent abroad during the war, as compared with before the war. The paper drew attention to the facts that there were fewer Far-Eastern voyages and that much of the traffic was concentrated in the Atlantic; but the enormous numbers of men involved should not be forgotten, nor the great amount of time spent by them in the manning pools abroad, particularly in Canada and the Middle East, and latterly in India.

It was worthy of mention that white firemen were used on coal-burning ships in the Indian Ocean and other tropical areas, partly because of the increase in the number of coal-burning ships and partly because fewer Chinese were available. Another matter which affected the health of the Merchant Navy was the time that crews were kept in unhealthy parts of the world such as Sierra Leone and, at a later stage, ports in India and Burma.

With regard to the average age in the Merchant Navy during the war, he thought it was quite possible that it had increased in the earlier part of the war. During the years of the depression, the shipowners had had a pool of labour to choose from and had tended to pick the youngest and hardiest men. As the rearmament programme developed, however, the shipowners had been driven to take the second best, so that the average age had probably risen as the war approached. In the early part of the war they were very dependent on the older men, and at the time when conscribed men were drafted to the Merchant Navy the age limits were very wide and included ages up to 44. The author had taken his samples in 1945, but by that time a number of the older men had been able to leave by discharge procedure, whereas the younger men were still held. It was very difficult to come to any conclusion about the average age, but his feeling was that in the earlier years of the war the population was much older than in the latter part.

Reference was made in the paper to the analysis of the discharges as recorded by the medical referees at various ports, and it was suggested that they did not indicate any great variation. As far as the incidence of disease was concerned, some figures that he had obtained over eighteen months showed that there was a tremendous variation from port to port due to the individual opinions of doctors. The shipping industry had issued certain standards of fitness as a guide to doctors during the war, which had been circulated to the Ministry of Labour and to the medical referees, but there were obvious variations between the various ports due to differences of medical opinion. For example, visual defects had always been highest in London, and dental defects month

by month were invariably high at Liverpool. He could not think that the eyesight of the seafaring population in London was really worse than it was in Liverpool. Peptic ulcers were almost invariably higher in Cardiff and Glasgow than in London or Liverpool, and Glasgow specialized in 'other diseases of the digestive system'. For complaints such as hernia, on the other hand, there was not much variation.

There were certain diseases about which he did not think that there could be any doubt, in particular venereal disease. The venereal disease returns from Cardiff and Barry were simply appalling; they averaged 18·4% of all diseases, as against 4% from the other ports from which returns were received. He did not think that doctors made mistakes about the question of disability due to venereal disease, and the figures definitely showed that the disease was much more prevalent in South Wales than it was at other ports.

As another illustration of the difficulty of getting standardized returns he mentioned non-tuberculous chest conditions. London tended to specialize in such conditions, but it was a remarkable fact that the returns from the Dock Street office were never quite as high as those from Connaught Road. The reason was merely that the doctors at Connaught Road were more particular about those conditions.

The 'black-out' undoubtedly had had a very great effect on the health of the Merchant Navy. Quite apart from the large number of accidents in the 'black-out', he thought that the cooping-up of men in ships, the lack of proper ventilation, and the possibility of submarine or bombing attacks all contributed to that effect.

With regard to the increase in discharges, there was no doubt that medical examination became more rigid as the Pool system became more efficient. There was, of course, as the war went on, extra 'wear and tear'; new standards were introduced, for eyesight in particular—not very much interest had been taken in the eyesight of ratings before the war. Discharges for ear troubles increased when operations started in the Far East, because it was necessary to be careful not to send men there who were liable to ear disease.

One reason why the medical statistics were not altogether reliable was that there was a certain type of seaman who would 'ship-jump' if he did not like the ship. In peacetime he had no difficulty in doing so, but in war-time he had to go to the Pool. Unfortunately, one of the easiest ways of obtaining discharge was to complain of illness. The master then had to get a doctor who had to decide at short notice whether or not the man was fit. There were many illnesses which showed no physical signs. For example, the man might complain of pain in the stomach, head or back. The doctor would not be able to see anything, but if he said that the man was fit the master would have an unwilling worker on board; so the man would be discharged from that ship on medical grounds. As the Pool system developed, that type of case became so much of a nuisance that the Pool doctors more or less agreed that a man who had had two discharges for a certain condition was better out of the Pool, and that led to an increase in the number of men discharged.

The psycho-neurotics were a constant source of worry. The numbers were appalling, but the group undoubtedly included a large number of men who might have been discharged as unsuitable. Many sent into the Merchant Navy during the war did not fit; they were square pegs in round holes and were got rid of as quickly as possible. At first, efforts were made to provide special treatment, and glowing reports were received of cures, but when such men were sent back to sea they almost invariably went sick again.

Men seeking discharge for illness were rather a trouble, because the Merchant Navy had not the same powers as the Services to send cases into hospital for observation. Very often a doctor would be called out to a ship at one of the convoy anchorages, sometimes not long before the convoy was due to sail. On the Clyde, the doctor's boat had only to be seen approaching a ship for there to be an epidemic of men wanting to see him. There was no time for the men to be properly examined, and numbers of them had to be regarded as sick and appeared as such in the returns.

The author had suggested that cases of bed-wetting should not have been accepted, but even when the direct question was put to applicants it was a thing which was never

admitted. The condition was only found out afterwards. It was the same with epilepsy, which had caused a good deal of serious trouble during the war. He had examined a number of the cases himself; in each case there had been a medical examination but usually the men had not been asked whether they had ever had epilepsy; when questioned, some of them admitted frankly that they had hoped they had had their last epileptic fit—presumably the epileptic always did; thus, the presence of epilepsy had not been suspected until a fit took place.

Though the sickness and injury figures were undoubtedly high, he felt that the Merchant Navy had got through the war extraordinarily well. In particular the morbidity due to tropical diseases and to tuberculosis was much less than might have been expected. The tuberculosis figures, so far as he had been able to check them, were not at all bad for the Merchant Navy, which always had slightly higher figures for mortality from tuberculosis than the average population—a standardized mortality ratio of 148 as against 100 was given in the *Registrar-General's Decennial Supplement*, 1931. The Merchant Navy was frequently accused, most unjustly, of being four times as bad in respect of tuberculosis as any other occupation, but there were 48 forms of occupation which had a higher rate than the Merchant Navy. There again, however, the medical inspections (as distinct from definite medical examinations) would never detect early tuberculosis. The introduction of mass radiography had been tried in Liverpool, but it had to be done voluntarily, and the response by the officers and men had been very poor. Early tuberculosis cases were not easy to discover even at a very thorough medical examination, and some did go to sea. He had no doubt at all that, contrary to what many people thought, the sea was not a suitable occupation for anybody suffering from pulmonary tuberculosis.

Sir Cyril Hurcomb (a visitor) thought that the first fact in the paper that would strike the imagination of everybody was the total figure of seamen who lost their lives during the war. If there were included some of those classes that were omitted from the paper—the fishermen (an important group), the British seamen who died in Allied ships, and about 1000 men who died as a result of war conditions but not at sea and in some cases many months after they had come ashore—about 30,000 men lost their lives from enemy action during the war in what was a purely civilian occupation, not a uniformed service and not under any form of military or naval discipline. Though the population at sea necessarily fluctuated, it was a striking tribute to the national character that that large body of men and lads went back to sea over and over again to incur those hazards.

A little more information was becoming available. The records of war-time deaths were being checked in order to produce a complete roll of honour, and that would enable a useful and accurate analysis of the deaths to be made and recorded. Almost all the prisoners of war had been accounted for, including 312 seamen who lost their lives while in captivity. Any further details which could help to supplement the results of the author's survey would be at his disposal and at that of the Institute.

While it was very important to keep in mind the sacrifices made by seamen during the war, it was necessary also to see what could be done to reduce the incidence of sickness among them in the future. There the analysis in the paper would be of the utmost assistance. It should be recognized, however, that it would not be as easy in the future to keep accurate statistics of sickness among seamen as it had been during the war. Records of the actual causes of wastage would not be quite so detailed, because seamen were free to leave the Service voluntarily. Perhaps that could be illustrated if he said that, after the war with Germany was over and a voluntary release scheme was introduced based on age and service, the rate of discharge for physical reasons at once showed a very heavy drop. Part of the explanation was that a man would give the easiest reason for getting out, and, if a man's age and his service entitled him to go, he would not base his case on his physical condition. The total discharges more than doubled immediately after the war. Over 40,000 men left the Merchant Navy in the twelve months following 'VE-day', and the average monthly number of discharges recorded as being for physical reasons was only 360 in the first ten months of 1946,

or about half the average number in war-time. He assumed, therefore, that there had been a large number of men who could have claimed discharge on physical grounds but who took the easier course of claiming it on those other grounds which were open to them.

The paper was of very great service not only because it called attention once more to an immense national effort by an important part of the employed population, the men at sea, but also because the critical analysis of the figures and the advice, comments and suggestions in the paper would enable the Ministry of Transport to lay a sound foundation and to draw up a proper datum line for future statistics and comparisons. He and his colleagues at the Ministry were greatly obliged to Sir William; they had made much use not only of his services but also of those of other members of the actuarial profession in the statistical and estimating work which had been so important for the control of shipping during the war.

Mr E. A. J. Heath, in closing the discussion, said that the author had made noble efforts to reduce to figures the epic struggle of the Merchant Navy. Behind the figures of the deaths of merchant seamen lay the loss of ships also. The figures indicated every stage of the war from the time when the country was right down on its knees and when, had losses continued at the same rate, it would have had very little chance of getting up again, until the time when the combined strength of the Allied Nations enabled a defence to be found, so that the scene was changed and instead of the harrying of British ships by the U-boats and German aircraft the U-boats themselves were hunted off the oceans.

Sir William Elderton's work during the war as Statistical Adviser to the Ministry was not merely one of collecting statistics in order to write a paper for the Institute. Sir William's work was entirely of a practical nature, and it was upon him, and in a lesser way upon those who were privileged to serve under him, that the Cabinet and the Chiefs of Staff relied in taking their decisions regarding what priority should be given to the different uses of shipping, and even regarding what actual operations could be undertaken. If Sir William said that a certain operation could not be carried out because the ships were not available, the Chiefs of Staff would have to take up other plans. Sir William was occupied in trying to meet the demands on shipping while the supply of ships was getting shorter, the Germans were spreading farther afield and trade routes were becoming longer. The whole object of the statisticians at the Ministry was to try to make the best use of the tonnage available.

It was only, therefore, towards the end of the war that the author had an opportunity to make use of the statistics which had been obtained during the war, and that was one of the reasons why he had found it so difficult to get an 'exposed to risk'. Personally, like the opener, he had been a little shaken at first on finding that the author had taken a population 10% below the pre-war figure, but there was no doubt that it had been necessary to make some assumption of that sort because of the change in the personnel of the Merchant Navy owing, for instance, to the requisitioning of the big liners. The author had made his own assumptions and had not made them too rigid; he had given readers a chance to take an upper and a lower limit, and they could make up their own minds how the excess mortality worked out.

He had listened with interest to Dr Caldwell-Smith, who had cleared up many of the difficulties he had met when getting out the figures for the author. The forms gave a very fine human story, but there were many points about them which had worried him a great deal. One such point was the question of medical examination, because it had seemed to him ridiculous that young men should go into the Merchant Navy and be discharged in a short time because their eyesight was not up to standard or because their ears were defective or because they wetted their beds. Dr Caldwell-Smith had explained very clearly the troubles which arose in that connexion.

With regard to the question of discrimination by doctors in different parts of the country referred to by Dr Caldwell-Smith, the figures of discharges for the various diseases had been carefully analysed, as the author had indicated, and in no case was there any statistical significance in the variations. Dr Caldwell-Smith had referred to

the extra incidence of peptic ulcers in Cardiff and Glasgow; that had shown up in the figures, but not sufficiently to enable it to be said that it was not purely due to chance. The only statistical significance obtained out of any of the figures was in respect of eye troubles in London, to which Dr Caldwell-Smith had also referred. Table 6, which related to months early in 1944, showed far fewer discharges on account of defective eyesight than Table 7, which related to a later period in the same year. The whole of that discrepancy was due to cases examined in London. A large number of them were examined by a doctor who was at the time acting as 'locum' for the regular examiner.

In tabulating the 'nervous' discharges, he had examined in every case any contributory factors which might have led to an anxiety neurosis. He found that in almost exactly 50% of the cases there had been a history of long immersion in the water or of some accident such as falling head first down a hold. It was interesting to find that the figures were almost evenly divided between the traumatic and the non-traumatic types.

He agreed with the author that little useful purpose could be served by using the figures of deaths in the other Services. He wished to emphasize that, although there was particular danger on the Malta and Arctic convoys, whenever a merchant seaman put to sea, and became a 'seaman at sea' as the author had described him, he was exposed to risk at once in every sense. In port before he sailed he was liable to attack by aircraft, and as soon as his ship put to sea he was in danger from mines, submarines and all the other fiendish devices that had been prepared for him.

The Chairman (Mr V. W. Tyler) thought that the author had presented an example of that rare paper, a combination of the historical with the practical. From a historical point of view it made fascinating reading, for in it was given, in the figures that the actuary was so well equipped to produce and to interpret, a picture of the very great part that the Merchant Navy played in the war. From it they learnt, for instance, that in the bad years the deaths from enemy action were as many as ten times as great as the normal deaths that occurred in peace-time, and that almost half of those who left the Merchant Navy during the war did so owing to nervous disorders, to stomach or duodenal complaints (which were held to be largely nervous in origin) or to chest troubles, information that testified very clearly to the great strain endured by the men of the Merchant Navy and to the hardships to which they were subjected. The historical side of the paper brought home very forcibly the great debt which was due to the men who 'went down to the sea in ships' and on whose bravery and endurance the safety of the country largely depended.

On the practical side, the author had pointed out some of the many rocks that strewed the not too well charted sea of statistics and had given valuable navigational aids to enable them to be avoided.

While rare in one respect, he thought that the paper was unique in another. One of the functions of the actuary was to use the lessons learnt from the experience of the past as a guide to the future. He thought that there would be general agreement with him when he expressed the hope that all the information which the author had given with regard to the events of the past war would not be of the slightest use as a guide to the future.

When reading the paper, two minor points had struck him and raised questions in his mind. The first was that the Lascars seemed to have experienced a somewhat less severe strain as a result of the war than the Europeans in the Merchant Navy. He believed that Lascars were recruited mainly in Bombay and other ports in India. Was it possible that the feature referred to was due very largely to the employment of Lascars in seas in which the risk of enemy action was less than the average? He had been interested that Sir William Currie had considered that to be a possible explanation.

The second point concerned the statement that almost half of those who left the Merchant Navy during the war on account of tuberculosis were at ages over 30. That did not appear to him to be in accordance with the views of a number of medical men and of many underwriters of life assurance that the risk of contracting tuberculosis had largely passed by that age. It would be interesting to know whether the author could give a reason for the apparent late onslaught of tuberculosis at sea.

Forty years previously he had become a pupil of Sir William—not a very bright one, he was afraid—and from that time his debt to Sir William began. Many of his generation were in that position, and during the years that debt had grown, for he and many others had from time to time taken to Sir William their little troubles and professional problems and had always received ready help. During that period the general indebtedness of the profession to Sir William had also grown, for during those years Sir William had not ceased to work on behalf of the Institute and of its members, and now, after the strain of the war years, when his unrivalled knowledge and experience were put at the disposal of his country, he had made time to produce the present instructive paper and had shown once again his great interest in his profession and its members. They were very grateful, and he proposed that a very hearty vote of thanks be accorded to the author.

Sir William Elderton, in reply, thanked the members for their vote and remarked that Mr Tyler was a much better pupil than he had tried to make out.

In answer to Mr Tyler's point regarding tuberculosis, he did not think that the average age of incidence of tuberculosis in the Merchant Navy was very different from that in the general population. He was under the impression that there had been a shift in the incidence of tuberculosis towards older ages. Concerning the lighter mortality suffered by Lascars as compared with white crews, he had already come to the conclusion that the explanation was that given by Sir William Currie, namely the different part of the world in which they were largely operating.

He was glad to find that the opener's figures agreed closely with his own, bearing in mind the somewhat different tabulation. The reduction of 10% which he had suggested in the population of seamen was probably correct. He had discussed it with the Registrar-General of Shipping and Seamen, and he thought that, taking the Merchant Service as a whole, it was the best estimate that could be made. Any difference that might appear in the experience referred to by the opener lay in the different proportion of officers, mainly owing to the increase of radio officers. He had been aware, of course, that the number of radio officers had increased, but there had been counterbalancing factors which were mentioned in the paper.

In answer to a question put by the opener, the Registrar-General's statistics were always adjusted when officers and men first reported as 'missing, believed drowned' were subsequently found to be prisoners of war.

He was glad that Sir William Currie had given some figures relating to the P. and O. Line. It was interesting to compare sectional figures of that kind with the whole. A good deal depended on where the ships were working, but that was known, and there seemed to be reasonable agreement with the results which he had reached.

Dr Caldwell-Smith, for whose remarks he was grateful, had dealt to a large extent with sickness during service, whereas the figures given in the paper were of people who were discharged. The incidence of disease might be, and he thought often was, different in the two cases. It was seldom, for instance, that a person would be discharged because his teeth were bad, but there might be a good deal of sickness and absence due to that cause. One particular illness which Dr Caldwell-Smith had mentioned was venereal disease, in regard to which he had contrasted Cardiff and Barry with other ports. It did not necessarily follow that the discharges for that reason were in the same proportion.

He thanked Sir Cyril Hurcomb for his kind remarks, and agreed that anything which could be done to reduce illness among merchant seamen would be one of the best things imaginable, but it would not be easy. One way of reducing sickness was to be quite sure that everybody who undertook a job was thoroughly fit. Sir Cyril's reference to the 1946 discharges was interesting, and personally he thought that the explanation must be that which Sir Cyril had given.

The figures in the paper showed very high mortality. In fact, the mortality was high among all merchant seamen, whether in British ships or in American or other Allied ships. That was a tragedy; it would have been an even greater tragedy had their effort been in vain.

The following communications have been received:

Mr B. G. H. Brown: I was particularly interested in this paper because in my younger days I had some practical experience of life in the forecastle of a merchant ship and also because during the war as Commanding Officer of a unit of the Sea Cadet Corps I was responsible for the early training of an appreciable number of lads who subsequently entered the Merchant Navy.

My interest was quickened also by reading that the work was undertaken for the Ministry of War Transport, and I trust that it will be continued in some form as the remarks at the end of paragraph 19 lead one to hope it will be. It would seem to show, if nothing else, that the authorities are alive to the question of the health of merchant seamen. This, I feel, is of much importance, because, although conditions are favourable in many of the big lines they do leave much to be desired in the case of the multitude of 'smaller fry'.

The first point that struck me on reading the paper was that the crews of ships sailing under the British flag before the war comprised men of many nationalities and that care would have to be exercised in making comparison between the figures relating to the war years and those prior to that time, but I have since learned that when Germany overran Northern Europe the British Merchant fleet acquired a large number of ships of those countries overrun which were manned largely by their own nationals. This would tend to adjust any discrepancies that might otherwise have existed, but at the same time the point should be borne in mind in any future investigations.

It is stated in paragraph 6 that the evidence is sufficient to show that the average age in war-time was less rather than greater than it was immediately before the war. This is what I would have expected.

The Sea Cadet Corps was formed originally by the Admiralty for the purpose of providing a preliminary training for entry into the Royal Navy and took in boys from the age of 14 upwards. From time to time numbers of special requests were made for whatever was most wanted from signalmen to cooks as the case might be, but I think it was during the winter of 1943–44 that strong representations were made that as many sea cadets as possible should be encouraged to volunteer for the Merchant Navy, which they were allowed to do at the age of 17.

For reasons which one might guess at but which are not material to my observations, these appeals, of which there were a number over some five or six months and which were undoubtedly due to the very heavy casualties that had been sustained, met with an extraordinary response as far as my unit was concerned, and on talking the matter over with officers from other units I found that their experience had been the same. The total strength of the Sea Cadet Corps throughout the country was some 50,000 boys, and I feel sure that as the result of these appeals very large numbers of lads went into the Merchant Navy as volunteers as soon as they reached the age of 17. This I am convinced is one of the contributory causes of the fall in the average age to which reference is made.

It is also stated in paragraph 7 that those entering the Service during the war were examined medically but that every entrant was not necessarily examined before the war. This is quite true; in the large Lines conditions approximating closely to those of the Royal Navy existed, but I very much doubt whether anything more than attendance for signing on at the local Board of Trade offices was required by many of the smaller shipowners. This fact undoubtedly had its bearing on the results because many men were rejected during the war who would have been taken into the Merchant Service during the years of peace.

Turning to paragraph 16, Sir William states that some wastage could have been avoided by a stricter initial examination of eyes and ears. I entirely agree as I know, from my own experience, of one lad who, by a combination of determination and luck and despite the fact that he was blind in one eye, was accepted. While waiting for his turn he memorized the letters on the card and, repeating them correctly when his blind eye was tested, was passed. This, I think, may be a particular case of the possible general cause of the higher average rate of discharge referred to at the end of paragraph 14.

When the demand for merchant seamen was greater than the supply less care was taken in selecting men for the Service, but as the war progressed more men became available and a natural weeding-out process took place.

The figures given in Table 8 and the resulting analysis are most interesting but caution should be exercised if conclusions drawn from them are to be applied in any way to the post-war years. The results might be different in time of peace on account of the probable increase in the average age of merchant seamen.

Mr W. J. Killingback: As regards Dr Caldwell-Smith's suggestion that checks at other periods of the war would have given a different result for the average age of seamen, I have had figures taken out from ships' agreements opened in each of the war years. Agreements were taken completely at random and the average age calculated of the first 1000 officers and men whose names appeared in these papers. The result of the test was as follows:

Year	Average age of 1000 seamen engaged	
1940	32·9	Over-all average 31·8
1941	33·5	
1942	31·5	
1943	32·4	
1944	29·5	
1945	30·7	

As will be seen, the new check gives 30·7 for 1945 whereas two earlier tests of 500 each gave nearly 32. The average age throughout is calculated to be 31·8, and the general conclusion in paragraph 6 of the paper remains perfectly true.

Mr Brown's remarks are interesting, particularly as I had a good deal to do with the recruitment and training of the sea cadets who volunteered for the Merchant Navy. In October 1943, we opened a special school at Wallasey for these cadets, giving them an intensive course before they entered the Pool on the way to sea-going employment. The special school closed down in May 1945, and during the time it was in operation 2261 sea cadets qualified for Merchant Navy Service. After the school closed, we continued to accept sea cadets for entry into the Gravesend Sea School (with other applicants) and altogether we know of a total of some 2500 sea cadets who became merchant seamen from October 1943.

Sir William Elderton has written as follows:

I am glad to see from Mr Brown's communication how closely his observations and impressions agree with the statistical evidence. I am grateful to Mr Killingback for the additional information about the ages of merchant seamen at various dates.