INDUSTRIAL MORTALITY IN 1915-1917.

To the Editors of the Journal of the Institute of Actuaries.

DEAR SIRS,—Recently I had occasion to investigate the mortality experience of a very large number of policies on male lives embodying industrial assurance contracts of various descriptions.

The general results obtained were sufficiently remarkable, I think, to be of interest to readers of the *Journal*. I have therefore, in the accompanying diagram, exhibited them graphically in comparison with two standard population curves, namely, Dr. Farr's English Life Table No. 3 and the English Life Table No. 8 published in the supplement to the 75th Annual Report of the Registrar-General. The function chosen for comparison is the rate of mortality q_x as shown by the following experience of males :

Rate of mortality experienced among industrial policies during 1913
" " " " " " 1915
" " " " " " 1916
" " " " " " 1917
" as shown by the English Life Table No. 8.
" " " " " No. 3.

The exposed to risk and deaths were obtained from the valuation class books which were very convenient for the purpose, the policies being tabulated on the assumption that on the average exact ages were attained at the date of valuation.

This method gives a possible range of nearly two years in the tabulated age, *i.e.*, the assumed exact age x represents ages between $x-1$ and $x+1$. Apart from abnormal disturbances in the law of mortality this method gives results reliable enough for most purposes. When, however, a section of the experience is subjected to a very violent change in the progression of the rates of mortality over a series of ages a certain amount of error is introduced. In the present instance the method of classification undoubtedly has the effect of over-estimating the rates of mortality at ages from 16 to 20, and somewhat under-estimating them thereafter.

The 1913 curve shows a close correspondence with that of the general population particularly at the military ages.

The curves for the three complete war years 1915, 1916, and 1917 each exhibit certain special features, and it is believed are the only published statistics showing the incidence of the War on the mortality of a section of the community sufficiently large to be representative of the whole male population.

The experiences of separate years were large enough to give results that did not require graduation to enable a reliable comparison to be made between them, and no such adjustment has been attempted. The close correspondence of the 1913 curve with the English No. 8 curve is sufficient evidence in support of this statement.

The remarkable feature of the 1915 curve is the continuance of high rates at ages over 40. The 1916 curve, while showing the

same main features as that for 1915, shows lower rates than the 1913 curve at ages over 40. The causes that gave rise to these features suggest some interesting speculations as to ages of men in the "Old Army" and the effect of war conditions on the vitality of the general population. I have not the necessary statistics available however to investigate these points. The 1917 curve exhibits two features of interest, namely, the moving of the maximum point to an age one year younger, accompanied by a reduction in the rate of mortality below age 20, that is, at the training ages.

The curves of course do not show the relative rates of mortality among combatants in the three years under review, but I think it may be claimed that they are a fair index of the toll that the War has taken of the manhood of the nation during that period.

I am, Dear Sirs,

Yours faithfully,

Prudential Assurance Co., Limited,
Holborn Bars, E.C. 1.
20 *March* 1918.

J. BURN.

*** Mr. Burn has kindly supplied the actual rates of mortality experienced by the Prudential at ages 16 to 60 in the years 1913 and 1915–1917. These rates are given in the following Table, with the addition (in the first column) of the English Life No. 8 rates:

Values of q_x. *Ages* 16–60. *Male Lives.*

Age	English Life No. 8	Prudential Experience			
		1913	1915	1916	1917
16	·00259	·00290	·00467	·00404	·00374
17	·00279	·00317	·00790	·00840	·00483
18	·00302	·00379	·01386	·01856	·01283
19	·00326	·00372	·01845	·03201	·03834
20	·00348	·00397	·02008	·03731	·04742
21	·00366	·00386	·01838	·03772	·04559
22	·00378	·00386	·01695	·03460	·04394
23	·00386	·00377	·01665	·03124	·04063
24	·00392	·00399	·01534	·02805	·03769
25	·00400	·00441	·01376	·02572	·03507
26	·00411	·00442	·01340	·02379	·03248
27	·00425	·00451	·01311	·02192	·03014
28	·00440	·00475	·01199	·02098	·02886
29	·00458	·00532	·01246	·02001	·02794
30	·00478	·00499	·01168	·01915	·02601

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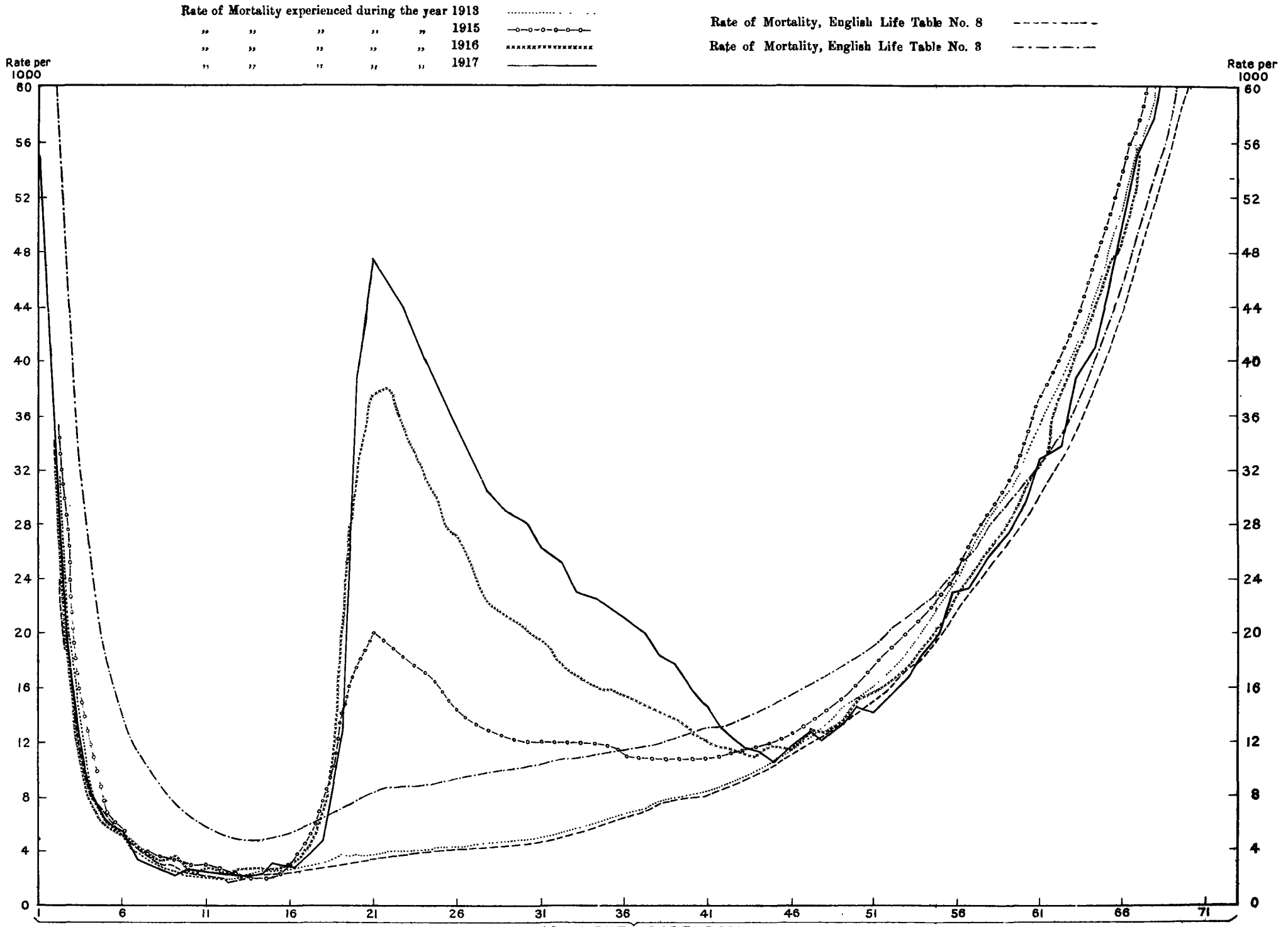
Rates of Mortality amongst Male Industrial Policyholders in the Prudential Assurance Company, Ltd.



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Values of q_x. *Ages* 16–60. *Male Lives—continued.*

Age	English Life No. 8	Prudential Experience			
		1913	1915	1916	1917
31	·00502	·00562	·01182	·01773	·02501
32	·00528	·00520	·01177	·01675	·02304
33	·00558	·00605	·01225	·01576	·02265
34	·00590	·00594	·01145	·01565	·02194
35	·00624	·00642	·01118	·01488	·02097
36	·00659	·00667	·01087	·01440	·01977
37	·00695	·00714	·01069	·01369	·01816
38	·00731	·00742	·01065	·01286	·01744
39	·00769	·00811	·01130	·01216	·01588
40	·00811	·00798	·01119	·01152	·01452
41	·00858	·00902	·01094	·01140	·01286
42	·00909	·00908	·01137	·01099	·01159
43	·00964	·01005	·01123	·01065	·01111
44	·01024	·01063	·01169	·01173	·01043
45	·01089	·01121	·01258	·01130	·01154
46	·01158	·01184	·01288	·01253	·01236
47	·01231	·01308	·01438	·01233	·01205
48	·01308	·01391	·01469	·01316	·01290
49	·01391	·01520	·01660	·01479	·01427
50	·01482	·01609	·01781	·01551	·01413
51	·01586	·01717	·01831	·01643	·01533
52	·01701	·01877	·01873	·01710	·01637
53	·01827	·01861	·02107	·01898	·01854
54	·01963	·02269	·02255	·02008	·01987
55	·02111	·02423	·02372	·02234	·02283
56	·02272	·02637	·02642	·02397	·02318
57	·02444	·02852	·02869	·02629	·02558
58	·02629	·02991	·03191	·02786	·02731
59	·02827	·03307	·03559	·03075	·02996
60	·03042	·03462	·03802	·03268	·03291

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