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ON THE
PHYSICAL CAUSES
OF THE
HIGH RATE OF MORTALITY
IN
LIVERPOOL.

READ BEFORE THE LITERARY AND PHILOSOPHICAL SOCIETY,
IN FEBRUARY AND MARCH, 1843.

BY

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1843.

Nunc, ratio quæ sit morbis, aut, unde repente
Mortiferam possit Cladem conflare coorta
Morbida vis hominum generi,—
Expeditam.—

Suspensa manet vis aëre in ipso:
Et, quom spirantes mixtas hinc ducimus auras,
Illa quoque in corpus pariter sorbere necesse est.

Lucret. de Rerum Natura, Lib. vi.

“ On the whole, then, the causes of the happy decrease of some of the most fatal and epidemic diseases, and the diminution of the fatality of others, may be in a great measure ascribed to the evident changes in the physical and moral condition of the metropolis,—from a state of perpetual filth and nastiness, to the open, airy, well paved, and comparatively cleanly condition in which it now is; and to the alterations in our domestic economy, in regard to situation, ventilation, and cleanliness.”

Bateman's Historical View of the State of Health, &c. in the Metropolis.



ON
THE PHYSICAL CAUSES, &c.

It has long been known that where a number of individuals are gathered together within a narrow compass, as in towns, the mortality among them considerably exceeds that occurring among an equal amount of population scattered over an extended surface, as in country districts. But it is only within the last few years, since the Registration Act for England and Wales came into operation, that we have been enabled to give precision to this knowledge by an appeal to facts upon a large scale, and of undoubted authority, by means of which we have ascertained the exact amount of the difference, and may point, with confidence, to the causes in which it has its origin. In the appendix to the Third Annual Report of the Registrar-General, a statement is given of the relative mortality of a town and country population, amounting, in each case, to upwards of three millions and a half, and combining the results of the observations of two years, 1838-39 :—

TABLE I.

	Area in Square Miles.	Estimated Population, Jan. 1, 1839.	Deaths Registered in Two Years.	Inhabitants to One Square Mile.	Annual Mortality.
* Country Districts	17,254	3,559,323	129,628	206	1 in 54·91
Town Districts ..	747	3,769,002	197,474	5045	38·16
England & Wales	57,805	265	46·00

* The *Country* Districts included in this statement comprise the Counties of Cornwall, Devonshire, Dorsetshire, Essex, Gloucester, (except Bristol and Clifton,) Hereford, Norfolk, (except Norwich,) Somersetshire, Suffolk, Sussex, Westmoreland, and Wiltshire. The *Town* Districts include the Metropolis, Bath, Birmingham and Aston, Bristol and Clifton, Cambridge, Carlisle, Derby, Dudley, Exeter, Leeds, Leicester,

Another evidence of the greater unhealthiness of towns is afforded by the comparative longevity of the inhabitants of the different districts, as shown by the following Table, in which the proportion of deaths, out of every 1000, which occurred at the age of 70 and upwards, in Devonshire, Dorsetshire, Wiltshire, Cornwall, Somersetshire, Norfolk, Suffolk, Cumberland, Westmoreland, Northumberland, (except the mining part,) and Lancashire, (north of Morecambe Bay,) is contrasted with the proportion occurring at the same ages in the Metropolis, Birmingham, Leeds, Manchester, and Liverpool.

TABLE II.

	Total Deaths, 1839-40.	Deaths at 70 and upwards.	Deaths at 70 &c. to every 1000 deaths
Country.....	52,204	10,538	202
Towns.....	71,544	6,457	90
England & Wales	141

To this it may be added, that the average age at death, in two counties, (Rutland and Wilts,) was $36\frac{1}{2}$ years; and in four towns, (Liverpool, Manchester, Leeds, and Bolton,) 19 years.

More than one cause may be assigned for this marked difference in the mortality of town and country districts; but the one great cause, which in its operation seems to absorb all others, is the vitiation of the atmosphere of towns; to effect which a number of agencies are constantly at work. By the mere action of the lungs of the inhabitants of Liverpool, for instance, a stratum of air sufficient to cover the entire surface of the town, to the depth of three feet, is *daily* rendered unfit for the purposes of respiration. If

Liverpool and West Derby, Manchester and Salford, Maidstone, Newcastle-upon-Tyne, Northampton, Nottingham, Sheffield, Stoke-upon-Trent, Sunderland, and Wolverhampton.

to this we add the changes caused by the products of combustion from forges, furnaces, and other fires, mingling with the atmosphere, (to say nothing of the enormous quantity of gas, oil, and candles nightly consumed in large towns,) and by the escape of gaseous effluvia from manufactories of different kinds, we shall have enumerated the principal sources of the unavoidable vitiation of the air of towns.

But it must be remembered that wherever large masses of the community are congregated together, there is a proportionally large amount of vegetable and animal refuse produced, which, in the process of decay, gives out various gases prejudicial to health, and whose effects will be proportioned to the more or less immediate removal of the matter, or to the attention given to its being so disposed of as to prevent the escape of the gases into the general atmosphere. Further, it has been observed that where a poor population is densely crowded, a kind of poisonous matter, of a highly contagious character, is generated in the system, affecting with Typhus and other fevers, not only those in whom it first originates, but spreading with rapidity, amid such a population, from individual to individual, from house to house, and from street to street. Could the atmosphere, in such localities, be renewed from time to time, the evil would be diminished; but from the high value of land in the larger towns which are the seats of industry, from the desire on the part of builders and landlords to secure the most profitable investment for their money, and from the total ignorance or neglect of hygienic principles, the dwellings of the poor have been constructed with the most notorious inattention to the means necessary to secure an efficient ventilation, either in the houses themselves, or in the courts and streets inhabited by the working classes. It is no part of my plan, in the present paper, to enter at any length on the consideration of the share which poverty has in augmenting the mortality of towns in general, or of Liverpool in particular; but as conclusions drawn from

comparative statements of mortality in classes of the population differing very widely in their command of the necessaries of life, would be obviously liable to suspicion, I may state, that there is less difference in this respect between the town and rural population of this country than might *à priori* be supposed. Mr. Farr, in his first letter to the Registrar-General, says, (p. 78):—"The occupations in cities are not more laborious than agriculture, and the great mass of the town population have constant exercise and employment; their wages are higher, their dwellings as good, their clothing as warm, and their food certainly as substantial as that of the agricultural labourer. The Poor-law Inquiry, and successive Parliamentary Committees, have shewn that the families of agricultural labourers subsist upon a minimum of animal food, and an inadequate supply of bread and potatoes. The source of the higher mortality in cities is, therefore, in the insalubrity of the atmosphere." On the other hand, it appears from a return quoted by Mr. Chadwick, "obtained in 1836 and presented to the Manchester Statistical Society, of the cattle passing the toll-gates and the meat sold in the markets, that the consumption exclusively amongst this population (the factory classes) could not be less than 105 lbs. each person annually, man, woman, and child, or 450 lbs. yearly per family, of butchers' meat alone, exclusively of bacon, pork, fish, and poultry."* Be this as it may, it appears from statistical documents presented to Parliament, that the proportion of paupers to the entire population is considerably greater in the agricultural than in the manufacturing counties; the fifteen principal agricultural counties having 1 pauper in every 8 of the inhabitants, while in the twelve principal manufacturing counties, the proportion is only 1 in 13. In Lancashire, it is 1 in 11. †

* Report on the Sanitary Condition of the Labouring Population of Great Britain, p. 182.

† See Appendix E to Eighth Annual Report of the Poor-Law Commissioners; and Tables compiled from it, in *Morning Chronicle* of 5th November, 1842.

But although it has been generally believed that large towns are more unhealthy than the open country, there has been, until very lately, a prevalent impression among not only the professional, but the non-professional part of our own community, that, as compared with other large towns, *Liverpool* occupied a favourable place in the scale of mortality. Dr. Dobson, in a paper printed in 1774, says:—“Leverpool is one of the healthiest places in the kingdom, in proportion to the number of the inhabitants.”* Mr. Moss, in his “Medical Survey of Liverpool,” published ten years later, says:—“the air is much more pure than it is commonly found in many parts of the kingdom,” (p. 23); and in another place, (p. 84):—“Liverpool may truly be said to be a healthful town; and that much more so than the generality of towns in the kingdom, in proportion to their amplitudes.” In a paper which appeared in a medical journal published in Liverpool only nine years ago, the “general character of the town for healthiness” was spoken of, and various good geological reasons were assigned to account for it.—So much for the opinions of the profession on the subject. To shew the strength of the belief among the non-professional part of the community, I may mention (without quoting the older writers, such as Enfield,) that about three years ago, I gave some evidence before the House of Commons’ Committee on the Health of Towns, as to the prevalence of disease among the working classes and the high rate of mortality in Liverpool, which evidence (although a mere statement of facts) was stigmatized by some of the public authorities here, (not, however, in their official capacity,) as a foul and unmerited libel on the “good old town.” Now the fact is, that judging from the annual proportion of deaths to the population, Liverpool is the most unhealthy town in England. The following Table gives a view of the relative mortality of seven of the principal towns, calculated on the average of the three years 1838–39–40:—

* See Enfield’s History of Liverpool, 2nd edit., p. 38.

TABLE III.

Towns.	Population, 1841.	Deaths.
Metropolis	1,870,727	1 in 37·38
Birmingham	138,187	„ 36·79
Leeds	168,667	„ 36·73 *
Sheffield	85,293	„ 32·92
Bristol.....	64,298	„ 32·38
Manchester (Union)	192,408	„ 29·64 †
Liverpool (Parish)	223,054	„ 28·75 †

The proportion of deaths occurring at the age of 70 and upwards, in the different towns, shews nearly the same result; but it is to be remembered that no absolute inference as to the healthfulness of these places can be drawn from this, unless the proportionate numbers *living* at the age of 70 and upwards, were exactly the same in each town. Until the results of the late census are laid before the public, we can have no means of correctly ascertaining the proportions living at different ages.

TABLE IV. †

	Total Deaths' (two years) 1839-41.	Deaths at 70, and upwards.	Number of Deaths to every 1,000 Deaths.	
			Above 70.	Below 5.
Metropolis	93,030	10,358	111	408
Birmingham ..	7,426	654	88	482
Leeds	8,701	688	79	480
Manchester....	16,546	990	60	510
Liverpool } (Parliamentary). }	18,084	970	54	528

* This applies to the Leeds "Registration District," which includes, I believe, a rural population of considerable amount. Mr. Baker, Inspector of Factories at Leeds, and author of the Sanitary Report on that town, has favoured me with particulars which enable me to state that the mortality of the *township* of Leeds, with a population of 87,613, and comprising eight of the twelve municipal wards of the borough, is 1 in 33.

† The rate of mortality in Liverpool and Manchester is deduced from the average of the *five* years, 1838-42.

‡ For convenience sake, I have added to this Table a column exhibiting the proportionate numbers of deaths below the age of 5. These facts will be subsequently referred to.

It is important, also, to bear in mind, that statements of the proportionate mortality of different towns or districts do not of themselves afford evidence which can be absolutely relied on as to the comparative healthfulness of those localities; for it is quite possible that the proportionate mortality of two districts may be the same, and yet the chances of life (or, the average duration of life) may be considerably less in the one than the other, from the fact of a larger proportion of the deaths occurring at an early age. The following Table,* however, shewing the average age at which the deaths occurred during one year, in five of the principal towns, confirms the fact of the extreme unhealthfulness of Liverpool, already inferred from the table of proportionate mortality:—

TABLE V.

	Average Age at Death.
Metropolis, <i>i. e.</i> , Kensington, Strand, White-chapel, and Bethnal-Green Unions	26½ years.
Leeds	21 „
Manchester	20 „
Bolton	19 „
Liverpool	17 „

The causes of this unfavourable position of Liverpool, both absolutely and relatively, will be found to be the same as those already indicated as the sources of the higher mortality of towns generally, and which appear, in Liverpool, to reach their maximum degree of intensity.

The population of the parish of Liverpool, by the census of 1841, amounted to 223,054; of whom about 160,000 may be estimated to belong to the working classes; and of these it is well-known that a large proportion inhabit courts and cellars, the remainder living in houses or rooms to the front of the street. As some of the members present

* See Sanitary Report, p. 176, *note*.

may not be acquainted with the character and construction of the COURTS in which so many of their townsmen reside, I may state shortly that they consist usually of two rows of houses placed opposite to each other, with an intervening space of from 9 to 15 feet, and having two to six or eight houses in each row. The court communicates with the street by a passage or archway about 3 feet wide,—in the older courts, built up overhead; and, the farther end being also in many instances closed by a high wall or by the back or side of an adjoining building, the court forms in fact a *cul de sac* with a narrow opening. Such an arrangement almost bids defiance to the *entrance* of air, and renders its free circulation through the court a matter of impossibility. When other circumstances, to be afterwards mentioned, are taken into account, such as the dense population and abominably filthy state of many of the courts, it is easy to understand in what way the construction of these dwellings may contribute to swell the mortality of Liverpool.—The Houses themselves are three stories high, contain three rooms of about ten or eleven feet square, and being built back to back with the houses of adjoining courts, there is of course no thorough draught. An enumeration of the court and cellar population of the Borough was made two years ago, under the authority of the Town-Council, when it appeared that there were, in the Parish of Liverpool,—

Courts.	Houses.	Inhabitants.
1982 .. containing ..	10,692 .. and ..	55,534.

That is to say, more than one-fourth of the whole parochial population, or more than one-third of the working classes, were resident in courts. With regard to the *character* of these courts, it appears from the report of the Corporation surveyors, that—

629, or nearly one-third, were closed at both ends;
875, or less than one-half, were open at one end; and
only 478, or less than one-fourth, open at both ends.

The CELLARS are 10 or 12 feet square; generally, flagged,—but frequently having only the bare earth for a floor,—and sometimes less than six feet in height. There is frequently no window, so that light and air can gain access to the cellar only by the door, the top of which is often not higher than the level of the street. In such cellars, ventilation is out of the question. They are of course dark; and from the defective drainage, they are also very generally damp. There is sometimes a back-cellar, used as a sleeping apartment,—having no direct communication with the external atmosphere, and deriving its scanty supply of light and air solely from the front apartment.

The enumeration already alluded to shewed that there were, in the twelve wards forming the *Parish* of Liverpool,

Inhabited Cellars.	Inhabitants.
6,294 containing	20,168,

exclusive of the inhabited cellars in courts (of which there were 621, containing probably 2000 inhabitants). From pretty extensive data which I have in my possession, I should be inclined to think these numbers, both of the court and cellar population, to be under the mark; but as they profess to be from actual enumeration, I am of course bound to take them* as I find them.* Of the entire number of cellars, 1617 have the back apartment I have mentioned; while, of 5297 whose measurements are given, 1771, or one-third, are from 5 to 6 feet deep,—2324 are from 4 to 5 feet, and 1202 from 3 to 4 feet below the level of the street: 5273, or more than five-sixths, have no windows to the front; and 2429, or about 44 per cent., are reported as being either damp or wet.

The STREETS inhabited chiefly by the working classes, are on an average perhaps about eight yards in width; they seldom exceed ten, and are sometimes not more than five yards across. Each house is usually occupied by two

* Possibly, casual lodgers have been omitted in the enumeration.

or more families, exclusive of the cellar, and most of the densely-peopled lodging-houses are situated in the streets. As a general rule, the houses have no thorough draught, from being frequently built up against the houses in the courts behind.

Such being the vicious construction of the dwellings themselves in point of ventilation, let us next see what means their numerous inhabitants possess to dispose of the large amount of refuse organic matter necessarily eliminated, in such a way as to prevent its contaminating the atmosphere. In other words, is the supply of PRIVIES and ASH-PITS, and the state of the DRAINAGE and SEWERAGE, adequate to the wants of a population whose solid *excretions* alone (exclusive of all other refuse matter), must amount to between two and three hundred thousand pounds weekly, or nearly six thousand tons annually.

With regard to the first branch of this inquiry, it may be stated at once that the whole of the cellar population of the Parish (upwards of 20,000) are absolutely without any place of deposit for their refuse matter. Of the front houses inhabited by the working classes, a large proportion are in a similar predicament. I am unable, on this subject, to give statistical data applying to the entire parish, but from an investigation made by the Watch and Scavengers' Committee, two or three years ago, I am enabled to state that in 26 streets of the description referred to, situated between Scotland Road and Vauxhall Road, and containing about 1200 front houses, not less than 804, or two-thirds, were without either yard, privy, or ash-pit. Although the Courts are better supplied in this respect, it may be doubted whether on the whole their inhabitants derive any advantage from the circumstance. In each of the larger courts there are usually two privies, with an ash-pit between them, situated within three or four feet of the doors and windows of the houses at the upper end, and which are the common property of all the houses in the court. These offices are often in such an abominably filthy

and ruinous condition, as to make it a matter of wonder how they can possibly be used ; the ash-pits are entirely uncovered, and the door of the privy is sometimes absent, having been broken or become dilapidated from age. In many instances the inhabitants of the front houses and cellars make use of the conveniences in the courts, so that the ash-pits generally become full to overflowing, long before the nightmen make their appearance to empty them. The consequence is, that the filth, which would otherwise find its way into these receptacles, is deposited in the corners of the court, in the entries or back passages adjoining it, or in the street itself. The street inhabitants who have no offices of their own, and who do not or cannot make use of the courts, are driven to deposit in like manner their refuse in the street or entries ; so that, in addition to the privies and ash-pits themselves, a large surface of the ground within and about these ill-ventilated courts and dwellings is constantly polluting the atmosphere with its noxious effluvia.

Were there any means of carrying off even the fluid portion of this superfluity of filth, the mischief would be lessened, as the noxious ingredients would less readily mingle with the air ; but no such facility exists, for I do not know of a single court in Liverpool which communicates with the street or sewer by a covered DRAIN. The fluid contents, therefore, of the overcharged ash-pits too frequently find their way through the mouldering walls which confine them, and spread a layer of abomination over the entire surface of the court. In some instances it even oozes through into the neighbouring cellars, filling them with its pestilential vapours, and rendering it necessary to dig wells to receive it, in order to prevent the inhabitants being inundated. One of these wells, four feet deep, filled with this stinking fluid, was found in one cellar under the bed where the family slept. I may mention also an instance of a cellar belonging to a cowkeeper, not inhabited, but used as a dairy—where milk was kept,

—and which, from the absence of drains and sewers, was filled with the poisonous fluid in question, and the air of the apartment rendered unfit to breathe. I mention this instance in particular, because it may come more home to the members than others which might be adduced; for although they may never be called upon themselves to inhabit the cellars in question, it is possible they may be called upon to drink the milk or cream which has been stationed there.

But, even supposing the Courts to be properly supplied with drains, these would at present be comparatively useless, from the absence of SEWERS in the front streets with which they could communicate; for it would of course be out of the question to allow them to discharge their contents into the open street. Within the last twelve years much has been done to improve the Sewerage of the Parish, more than £100,000 having been expended under a local act in the formation of sewers; but these have been principally main sewers in the leading streets, and a very small proportion of the bye-streets inhabited by the working classes have as yet participated in the benefit of the Act. I know not whether it is the intention of the Commissioners to extend their patronage to these streets, nor indeed whether they have the power to do so; although, from the fact of some of them being sewered, I infer that the legal power, at all events, is not wanting to sewer the whole. It can be no matter of doubt that the power ought to exist somewhere, and that it should be exercised as speedily as possible. It is far from my wish to cast any reflections on the Commissioners of Sewers, who, I am sure, have endeavoured to carry out the provisions of the Act in the way which they deemed most beneficial to the town. In my entire ignorance of their powers, their means, and their plans, it would not become me to express any doubt as to the wisdom of what has been already executed under their direction. No doubt, main sewers must be laid down before branches can be formed; and it can

only be looked on as unfortunate that in the poor streets which are as yet nearly destitute of sewers, the necessity for them is much more urgent than in the wider streets where the main sewers have been almost exclusively laid down.

With the assistance of the Map published not long ago by the Commissioners of Sewers, I have made a rough estimate of the length of the sewers formed under their direction in the *inhabited* streets of Liverpool. The number of inhabited streets in the Parish I estimate at 566, measuring 101,290 yards, or about $57\frac{1}{2}$ miles; of which 235, measuring $25\frac{1}{2}$ miles, are either wholly or partially sewered. But these $25\frac{1}{2}$ miles are very unequally divided among the different classes of the inhabitants; for while, of 243 streets, measuring about 20 miles, inhabited chiefly by the working population, only 56, measuring about four miles, are sewered, the proportion of sewerage in the streets chiefly occupied by other classes of society, is 179 streets, measuring about $21\frac{1}{2}$ miles, out of 323, measuring $37\frac{1}{2}$ miles.

TABLE VI.

Description of Streets.	TOTAL.		SEWERED.	
	Streets.	Miles.	Streets.	Miles.
Inhabited by Working Classes	243	20	56	4
„ by other Classes ..	323	$37\frac{1}{2}$	179	$21\frac{1}{2}$
Total	566	$57\frac{1}{2}$	235	$25\frac{1}{2}$

The next element of mortality (and I believe one of the most important) to which I have to direct your attention, is the unusual DENSITY OF THE POPULATION of Liverpool. It was of course to be expected that the evils arising out of the concentration of the population would, *ceteris paribus*, be aggravated in proportion to the *degree* of concentration; and that this is the case with regard to Liver-

pool I shall presently endeavour to show, in so far as the difficulty of eliminating the effect of a single cause out of the combined effects of several will permit me to do so. The aggregate density of the population of England and Wales is in the ratio of 275 inhabitants to a square mile. The towns, of course, present a much higher ratio; the average density of population in the twenty-one principal towns included in the first Table, being 5045 inhabitants to a square mile,—in some cases being considerably above, and in other instances below, this standard. The following Table, giving the ratio of density in five of our most populous towns, shows that Liverpool, in this respect also, enjoys its usual bad pre-eminence.

TABLE VII.

Towns.	Inhabitants to Square Mile.	
	Total Area.	Builded Area.
Leeds.....	20,892	87,256
Metropolis	27,423	50,000 ?
Birmingham.....	33,669	40,000 ?
Manchester (Township) ..	83,224	100,000 ?
Liverpool (Parish)	100,899	138,224

I am not in possession of information enabling me to fill up the second column of this Table accurately, in so far as relates to London, Birmingham, and Manchester; but with regard to the two latter, it is not probable that they contain within their boundaries any considerable extent of unbuilded area;* and if we assign 40,000 inhabitants to Birmingham, and 100,000 to Manchester, for each square mile of builded area, we can hardly have underrated the

* I am informed by my friend Dr. Black, of Manchester, who has written an interesting Paper on the Vital and Mortuary Statistics of that town, that "there is no space whatever left unoccupied in the township of Manchester."

density of their population. The Metropolis, including as it does an extensive range of outskirt, must have a larger allowance made for the open area within its limits, so that the population on its *buildded* area would probably not be less than 50,000 per square mile. Should this estimate approximate to the truth, the towns would stand, in reference to the density of population on their buildded areas, in the order of their relative mortality, (see Table III., page 8,) viz. Birmingham 40, London 50, Leeds 87, Manchester 100, Liverpool 138. Particular portions of all these towns are much more densely peopled than the average here given; but it may be doubted whether any English town could afford examples of a greater concentration of the inhabitants than exists in one or two localities in Liverpool. In a Paper published about three years ago in a Periodical Journal, it is stated, that "in some of the most populated parts of Liverpool the rate is so high as 83,262 per square mile;" and Mr. Farr, in noticing the extraordinary density of population in a small portion of London, (East and West London Unions,) where there are nearly 243,000 inhabitants to a geographical square mile, states that this is "the greatest density attained in the heart of English cities." I shall, however, mention, by and bye, a district of Liverpool containing about 12,000 inhabitants crowded together on a surface of 105,000 square yards, which gives a ratio of 460,000 inhabitants to the geographical square mile; and if we confine the calculation to a smaller portion of this district, but still comprising a population of nearly 8000, (on 49,000 square yards,) we shall find the inhabitants packed together in the proportion of 657,963 to the geographical square mile, being nearly $2\frac{3}{4}$ times the maximum density of London, as stated by Mr. Farr. The most densely populated ward of Leeds, the only other town with regard to which I possess the means of comparison as to maximum density, gives a rate of only 193,500 inhabitants per geographical square mile on its buildded area.

With regard to individual dwellings, it is in the "lodging-houses,"—usually situated in the front streets, but sometimes in the courts,—that the overcrowding of inmates is carried to the highest pitch. The worst description of houses of this kind are kept by Irishmen, and they are resorted to by the migratory Irish, among others, who may perhaps not remain more than a night or two in the town, as well as by vagrants and vagabonds of all descriptions. In every room of such houses, with the exception of the kitchen or cooking-room, the floor is usually covered with bedsteads, each of which receives, at night, as many human beings as can be crowded into it; and this, too, often without distinction of sex, or regard to decency. But there are cellars, usually the double cellars I have described, which are used for the same purpose; and here the overcrowding is carried still further, if that be possible, and is certainly even more prejudicial to the health of the inmates, from the still more defective ventilation of these dark and miserable abodes. At night, the floor of these cellars—often the bare earth—is covered with straw, and there the lodgers—all who can afford to pay a penny for the accommodation—arrange themselves as best they may, until scarcely a single available inch of space is left unoccupied. In this way as many as thirty human beings, or more, are sometimes packed together underground, each inhaling the poison which his neighbour generates, and presenting a picture, in miniature, of the Black Hole of Calcutta. Each individual, in the course of the night, vitiates about 300 cubic feet of atmospheric air, rendering it quite unfit for the purposes of respiration; and if we suppose thirty pair of lungs engaged in this process, we shall have 9000 cubic feet of air rendered noxious during the period of sleep. But the cubic contents of the cellars in question do not, on the most liberal computation, exceed about 2100 feet: which is the same thing as to say that *thirty* individuals are furnished with a supply of air sufficient for the wants of only *seven*. The Inspectors

of Prisons in England recommend "not less than 1000 cubic feet" for every prisoner, "as being essential to health and ventilation," and yet here we have free agents voluntarily immuring themselves within a space which limits them to a supply of 70 feet, or less than one-fourth of the minimum necessary for the purposes of healthy respiration. I speak, of course, with reference to the imperfect natural ventilation of the cellars, aided, as this source of mischief is, by the pains taken to exclude even a breath of air from without. I have described an extreme case, but it is one which every medical man who has practised extensively among the poor, must have had an opportunity of witnessing, and I believe it may be said without fear of contradiction that there is scarcely a "lodging" house or cellar in the town, whose inmates are not, as a general rule, too numerous for the breathing space afforded them. The natural consequences follow. Fever breaks out from time to time, and spreads with rapidity among the inhabitants. Nor is this the worst; for, from the migrant character of their population, these dens become *foci* which radiate infection not only throughout the town, but to other towns, and to distant parts of the country. But the evil of overcrowding is not confined to the lodging-houses. The houses, both in streets and courts, are very generally sublet, each room being sometimes occupied by one or more families: so that it is not uncommon to see an apartment ten or twelve feet square, and, perhaps still more frequently, a cellar of the same dimensions, inhabited by twelve or fourteen human beings; giving a ratio of condensation in the case of the cellar (which is lower in the roof,) very nearly as high as in the case of the worst lodging-cellars just noticed.* In some districts of the town, inhabited chiefly by the lower Irish, whole courts and streets

* Wishing to adhere pretty closely to the object of the paper, *i. e.* to point out the physical causes of the high rate of mortality, &c.,—I have said nothing as to the very *low* rate of *morality* which many of these causes tend to induce.

are densely crowded. Some instances of the latter will be afterwards mentioned; at present I shall only notice a filthy, pent-up court (in Crosbie-street), containing 118 inhabitants on an area of 150 square yards, or about $1\frac{1}{4}$ square yards to each. The average breathing-room during the night for the entire population of the Court, would be little more than one-half of what it ought to be, supposing the inhabitants succeeded in their attempts to prevent the admission of fresh air to the houses. In this Court, fifty cases of Fever, (nearly one-half of the entire number of inhabitants), were attended by the Dispensary in a single year, besides a considerable number of patients with other diseases.

By the last Census, the number of inhabited houses in Liverpool was 32,079, which gives an average of very nearly seven inhabitants to each house. The average of the Court just mentioned, (by no means the worst that could be adduced), is 15 inhabitants per house; and there are some entire streets of small houses, where the average, including both front and back houses, is nearly as high.

Now, all the conditions which I have mentioned, viz., *the vicious construction of the dwellings, the insufficient supply of out-offices and of receptacles for refuse and excrementitious matter, the absence of drains, the deficient sewerage, and the overcrowding of the population,* tend in the same way to increase the mortality of Liverpool, *i. e.* by contaminating the air which its inhabitants are compelled to breathe. If it is considered that each individual requires a daily supply of upwards of 600 cubic feet of *pure* air, to maintain the healthy composition of his blood, there will be no difficulty in understanding why, if 600 cubic feet of *tainted* air be supplied to him instead, and that not for one day only, or occasionally, but constantly and habitually, the chance, or rather the certainty, is, that he must die before his time. But if we are asked to point out, more explicitly, the *modus operandi* of these causes, in increasing the mortality of Liverpool, we reply that they act partly by inducing a specific disease, and partly

by deteriorating the general health of the inhabitants in such a way as to render them more prone to the attacks of nearly all diseases, but more particularly of the specific disease alluded to, and also of those organs which feel the first brunt of the poison, *i. e.* the organs of respiration.

The disease I refer to is FEVER,—the common fever of this country, which may be taken as a generic term, including the varieties known as typhus, synochus, low adynamic fever, brain fever, nervous fever, &c., and which I shall presently show to be the characteristic disease of the poor of Liverpool. With regard to one, at least, of the conditions noticed, *i. e.* the congregation of the inhabitants within small and pent-up areas, where the means of ventilation are denied, (and where, as I formerly observed, the atmosphere is vitiated not by their respiration only, but by the poisonous emanations which arise from their bodies,) there can be little doubt as to its being an efficient cause of fever, the fact being established by the concurrent testimony of nearly every medical writer of repute. The operation of this cause, in its highest intensity, is shewn in the case of the Black Hole of Calcutta, where, out of 146 human beings who were confined within a space of about 5000 cubic feet, not more than twenty-three survived the night, and these “were said to have been afterwards attacked with a fever analogous to typhus.” The same cause acting in a less concentrated form, produces the same effects, more slowly, it is true, but not the less surely, in the “black holes,”—the crowded courts, and cellars, and lodging-houses,—with which Liverpool abounds. I could give many examples in proof of this, were it not a matter so notoriously admitted, both in theory and in fact, that it would be a needless occupation of your time to do so. One or two instances are mentioned in my Report to the Poor-Law Commissioners on the sanitary condition of Liverpool, in which are also introduced some other particulars and illustrations of the subject, which I have therefore abstained from repeating here. Formerly,—before

attention was paid to ventilation in the construction of our public buildings destined for the reception of large numbers of inmates,—Fever was never absent from our crowded gaols, and hospitals, and barracks; while our transport-ships seldom made a voyage without losing a considerable proportion of the troops, from the same disease. So much was this the case, that the disease obtained a specific name from the circumstance,—“Jail Fever,” “Hospital Fever,” “Ship Fever,” “Camp Fever,” being terms constantly met with in medical writings. Even where the individuals who generate the poison remain free from its effects, they may communicate the fever to others, as was the case in what is known—from that circumstance—as the *Black Assize* at Oxford in 1577, where the Lord Chief Baron, the Sheriff, and about three hundred more, (all who were present in the court,) were infected by the prisoners, and died within forty hours; and also in the famous Old Bailey session of May, 1750, in which most of those present who occupied one side of the Court (including the Lord Mayor, two of the Judges, and one of the Aldermen on the bench), so as to receive the emanations from the prisoners’ bodies,—contracted fatal typhus.

As illustrating the effect of overcrowding in the wards of Hospitals, it will be sufficient to quote the experience of the late Mr. Pearson, a surgeon of eminence, attached to the Lock Hospital in London, who “uniformly observed, when more than a certain number of patients were placed in any of the wards, fever became prevalent in the establishment; and from repeated observation of this fact, he was induced to restrict the number of beds in each ward, and never afterwards witnessed the recurrence of fever in the house.”

It is still a disputed question among the medical profession, whether the malaria, arising from the accumulation of filth from decomposing animal and vegetable matter, such as the contents of ash-pits and cesspools,—is sufficient in itself to *generate* fever. Although there are numerous re-

corded instances in favour of the affirmative, and many high authorities support that side of the question, I am myself inclined to doubt whether this is an efficient cause of fever, independently of other circumstances. But there is no difference of opinion as to the most important point in this inquiry, *i.e.* as to the fact of these exhalations favouring, in the highest degree, the extension of the disease when it has once appeared in a locality where they abound. It is admitted on all hands that, although this condition may not suffice to *originate* fever, it invariably promotes its rapid *extension*.*

As to the influence of deficient ventilation, I may refer to the comparative absence of fever in our prisons, and workhouses, and hospitals, since the proper principles of construction have been better understood; as well as to the improvement, in this respect, in certain situations in large towns, where densely-peopled localities have been opened up, and streets carried through them so as to admit a freer circulation of air. I may mention one instance of this kind in Liverpool,—St. Andrew Street,—through which a pretty wide street was carried, some years ago, with the effect of diminishing, to a considerable extent, the

* The Plague, with which typhus fever has strong analogies, “has always originated and maintained its head-quarters in the filthiest parts of the cities it has visited, as in St. Giles’, in London, in 1665, and in Whitechapel in 1626 and 1636.” Towards the end of last century it raged at Cracow, where, according to Mr. Wraxall, “nothing can be so execrable as the paving, which scarcely deserves the name. There is not a single lamp in the place; no precautions are used to cleanse the streets, which, of course, become infectious in summer and almost impassable in winter.” The state of the habitations of the poorer classes in England is thus described by Erasmus, about two centuries ago, immediately previous to the Plague of London:—“The floors are commonly of clay, strewed with rushes, which are occasionally renewed, but underneath lies unmolested an ancient collection of beer, grease, fragments of fish, spittle, the excrement of dogs and cats, and everything that is nasty.”—*Bateman on Diseases of London*, p. 17. “Dr. Hancock observes,” (I quote from the Thackeray Prize Essay, by Dr. Davidson), “that most writers on the Plague have remarked the exemption of Persia from this disease, and he quotes the following passage from the *City Remembrancer*:—‘The Persians, though their country is every year surrounded by the plague, seldom suffer anything from it themselves; they are the most cleanly people in the world, many of them making it a great part of their religion to remove filthiness and nuisances of every kind from all places about their cities and dwellings.’”

number of fever cases occurring there. Doctors Barker and Cheyne, in their *History of the Fever Epidemic in Ireland*, in 1817-18, state a remarkable instance of a ward in Sir Patrick Dun's Hospital, by the peculiarity of its construction—affording unusual facilities for ventilation—protecting the attendants upon the sick from the effects of contagion. When the Hospital, “by agreement with government, contained 100 patients in fever, the male ward (the one in question) was crowded, containing 44 patients, yet only one nurse was affected with fever; at the same period, the nurses in attendance on the female patients, who were certainly not so much crowded together, were continually taking the complaint, and generally had it with severity.” On this subject I shall merely add an example to the same effect, mentioned by Mr. Chadwick in his *Report on the Sanitary Condition of the Labouring Classes in Great Britain*. He says there is in Glasgow, attached to one of the factories, “an assemblage of dwellings for their work-people, called, from its mode of construction and the crowd collected in it, the Barracks. This building contained 500 persons; every room contained one family. The consequences of this crowding of the apartments, which were badly ventilated, and the filth, were, that fever was scarcely ever absent from the building. There were sometimes as many as seven cases in one day, and in the last two months of 1831, there were fifty-seven cases in the building. All attempts to induce the inmates to ventilate their rooms were ineffectual, and the proprietors of the work, on the recommendation of Mr. Fleming, a surgeon of the district, fixed a simple tin tube of two inches in diameter, into the ceiling of each room, and these tubes led into one general tube, the extremity of which was inserted into the chimney of the factory-furnace. By the perpetual draught thus produced upon the atmosphere of each room, the inmates were compelled, whether they would or not, to breathe pure air. The effect was that, during the ensuing eight years, fever

was scarcely known in the place. The cost of remedies previously applied in the public hospitals to the fever cases, continually produced as described in the barracks, was stated by Dr. Cowan to have afforded a striking contrast to the cost of the means of prevention." (p. 107.) It is the more airy and better ventilated condition of the dwellings of the wealthier classes which explains the fact, that when fever does happen to be introduced there by contagion, it is hardly ever known to spread; while, in the badly-ventilated houses of the poor, it seldom stops with the individual first attacked. In the former case, the fever-poison is at once freely diluted and speedily carried off; in the latter case, it accumulates until the whole atmosphere of the dwelling becomes impregnated with the noxious virus.

The causes I have mentioned are in operation, more or less, in almost every town, and if it be true that they are influential in the production or extension of fever, we should expect to find that disease more prevalent in towns generally than in the country, where the effluvial gases are more at liberty to follow the bent of their nature, and diffuse themselves through the circumambient atmosphere with velocities inversely proportioned to the square-roots of their densities. And this we find to be the case. Comparing the number of deaths from fever in two years, in the towns and in the country districts comprised in the first table, we find there were 10,930 in the former, and only 6,515 in the latter; the proportion being about 168 in the towns to 100 in the country districts, (which include, however, a number of towns of inferior magnitude.) Further, if it be true that these causes act with greater energy in Liverpool than elsewhere, their effect, or fever, ought also to appear in a greater ratio; and this, too, we find to be the case. Previously to the publication of the Reports of the Registrar-General, I stated my belief, founded chiefly on the records of Dispensary practice, that 1 in 25 of the working population of Liverpool was annually affected with fever, and that this probably afforded a higher

ratio than any other town in England. This estimate is confirmed by the following table, shewing the number of *deaths* from fever, in the five principal towns of England, during the whole period ($3\frac{1}{2}$ years) comprised in the Registrar-General's published reports :—

TABLE VIII.

Towns.	Deaths by Fever.*	Total Deaths.	Per centage Proportion of Fever Deaths to others.	Proportion of Fever Deaths to Population Annually.
Birmingham	502	12,224	4·10	1 in 917
Leeds (Parliamentary Borough)	661	14,747	4·48	,, 849
Metropolis	9,150	189,379	4·83	,, 690
Manchester (three years)	1,121	19,969	5·61	,, 498
Liverpool and West Derby	2,060	33,022	6·23	,, 488
Liverpool (Parish)	1,795†	26,456	6·78	,, 407

“Liverpool and West Derby” include a rural population of about 25,000 beyond that of the municipal borough, but notwithstanding this, it presents a larger proportion of deaths from fever than any other town, not only as compared with the population but with the total number of deaths from all causes. In the *parish* of Liverpool, the proportions are as high as 1 in 407 of the population annually, and 6·78 per cent. of the total deaths,—while the proportion in the more thinly-peopled and better-ventilated suburbs is only 1 in 1,037 of the population, and 4·03 per cent. of the total deaths.

But the operation of these physical causes is not confined to the generation or extension of fever. When acting with a less degree of intensity, they may still be sufficient to affect the general health; and, in fact, they *do* deteriorate

* Exclusive of Scarlet Fever and the Exenthemata.

† This gives 513 yearly for the parish alone; and as the mortality of fever in Liverpool is not more than 1 in 12 or 15 cases, 513 deaths will represent about 7,000 cases of fever, which, multiplied by 25, will yield more than the estimated number of the working population.

the health of those exposed to their influence, and call into action the latent germs of *other* diseases. It would be a waste of time to point out the way in which the general health is injured by the habitual respiration of contaminated air, but there are one or two diseases whose existence seems specially favoured by this circumstance, and to these alone I shall call your attention. The first I shall notice is CONSUMPTION.

It seems natural to expect that the organs with which the foreign gaseous ingredients of the atmosphere come more immediately into contact, and whose blood-vessels they must enter on their passage into the system, should feel, in a distinctive manner, their noxious influence; and this *à priori* expectation is strengthened by observation both in man and animals, as well as by experiment on the latter. It has been observed that where individuals breathe, habitually, impure air, and are exposed to the other debilitating causes which must always influence, more or less, the inhabitants of dark, filthy, and ill-ventilated dwellings, scrofula—and consumption, as one of its forms—is very apt to be engendered, even where the hereditary predisposition to the disease may be absent. Professor Alison, one of the highest authorities on this subject, remarks:—“It is hardly possible to observe separately the effect on the animal economy of deficiency of exercise and deficiency of fresh air, these two causes being very generally applied together, and often in connexion with imperfect nourishment. But it is perfectly ascertained, on an extensive scale, in regard to the inhabitants of large and crowded cities, as compared with the rural population of the same climate,—*first*, that their mortality is very much greater, especially in early life, and the probability of life very much less; and, *secondly*, that of this great early mortality in large towns, a very large proportion is caused by scrofulous disease. And from these two facts it evidently follows, that deficiency of fresh air and of exercise, are among the most powerful and the most important,

because often the most remediable, of the causes from which the scrofulous diathesis arises."* Sir James Clark, who has written the best monograph on Consumption in our language, regards "the respiration of a deteriorated atmosphere as one of the most powerful causes of tuberculous cachexia," (*i. e.* the constitutional affection which precedes the appearance of consumption). He says, "If an infant born in perfect health, and of the healthiest parents, be kept in close rooms in which free ventilation and cleanliness are neglected, a few months will often suffice to induce tuberculous cachexia." "There can be no doubt," he adds, "that the habitual respiration of the air of ill-ventilated and gloomy alleys in large towns, is a powerful means of augmenting the hereditary disposition to scrofula, and even of inducing such a disposition *de novo*. Children reared in the workhouses of this country, and in similar establishments abroad, almost all become scrofulous, and this more, we believe, from the confined impure atmosphere in which they live, and the want of active exercise, than from defective nourishment."† The same distinguished physician has actually succeeded in inducing consumption in rabbits, by confining them in a cold, dark, damp, close situation, and supplying them with innutritious food. Monkeys present the same phenomenon in this country, where they are often crowded together during the winter in a confined and heated atmosphere, and where true tubercular consumption commits more extensive ravages among them than it does even among the human race. It is known, also, that this malady is very prevalent among the cows which supply milk to the inhabitants of some large towns, where they are immured during part of every year in dairies perfectly closed, and which, being too small for the number of animals they contain, soon become filled with heated, vitiated air, for the removal of which no proper provision

* Outlines of Pathology and Practice of Medicine, p. 194.

† Cyclop. of Pract. Medicine, IV. 320.

is made. This is remarkably the case with the cows belonging to the milkmen of Paris, which are annually carried off by consumption in considerable numbers.* A confirmation of the influence of this cause is afforded by the exemption of the horse from consumption, although frequently placed in the same circumstances with the cows, but with intervals of exposure to fresh air and the enjoyment of exercise. Where a number of horses, however, are collected together in ill-ventilated stables, they may become consumptive. Mr. Chadwick says, that a discovery of this kind “was only lately made as to the effect of defective ventilation on the cavalry horses, in some of the government barracks in England; and it is stated that a saving of several thousand pounds per annum was effected by an easy improvement of the ventilation of the barracks near the metropolis.” (p. 104.)

Before stating the proportion of deaths from consumption in Liverpool, it will be proper to say a few words as to the nature of the EFFLUVIA ARISING FROM PRIVIES, CESS-POOLS, &c. The principal gas given out from these deposits is sulphuretted hydrogen, the most deadly of the gaseous poisons, two or three cubic inches causing instant death when injected into a vein, or into the chest, or beneath the skin of animals. A rabbit died in ten minutes after being enclosed in a bag containing sulphuretted hydrogen, although its head was left free so as to allow it to breathe the pure atmosphere. Nine quarts injected into the intestines of a horse, as a common clyster, killed it in a minute; and I have heard it stated that it is difficult to keep horses in high condition in the immediate neighbourhood of large privies where sulphuretted hydrogen is abundantly given out. Even when largely diluted with atmospheric air it

* *Rapport à M. le Préfet de Police, sur la Pommelière ou Phthisie pulmonaire des vaches laitières de Paris et des environs; in Annales d'Hygiène, XI. 447.* The Reporter says,—“The only measure which the administration can take to diminish the evil is to direct the keepers to provide very wide and very lofty stables for their cows, in order that they may contain the quantity of air necessary for the respiration of the animals during a long space of time.” (p. 453.)

retains, in a great degree, its noxious properties. A dog was killed by being made to breathe a mixture of 1 part of this gas with 800 parts of common air; and air containing only 1-1500th part of sulphuretted hydrogen proves speedily fatal to small birds. If the principal ingredient of these emanations is capable of exerting such destructive agency, we should expect it to have shewn its effects occasionally on the men employed in clearing out the places where it accumulates. Various instances of this kind are on record, in some of which immediate death followed the incautious inhalation of the effluvia in a concentrated form; and in others, where the gases were more diluted, the persons breathing them became faint, delirious, and insensible, or were attacked with convulsions, even where they ultimately recovered. The most remarkable examples of this kind have occurred in France, where the contents of the *Fosses d'aisance* are allowed to accumulate for a long period; but it is not a great many years since four men fell victims to the poison while engaged in clearing out a privy near Brompton; and still more recently an accident of a similar nature happened at Clapham.—Twenty-three children, belonging to a boarding-school at that place, were simultaneously attacked with violent irritation of the stomach and bowels, convulsive twitchings of the muscles, and excessive prostration of strength; and two of them died in about twenty-four hours. The symptoms were ascribed, by the medical attendants, to the inhalation of sulphuretted hydrogen from the contents of a foul cess-pit, which had been scattered over a garden adjoining the children's play-ground. Although these effluvia are breathed by the inhabitants of our courts and back streets in a state, of course, of extreme dilution, we cannot suppose that they are on that account entirely harmless. What, in a concentrated form, is so very deadly, *must*, in a diluted state, be injurious to health.

The influence of this and of the other unfavourable conditions of the residences of the working classes will, of

course, be felt most readily and most severely by those of feeble constitutions, where the powers of nature are unable to wage an unequal war with such a numerous cohort of morbid agencies. *Infancy*, in particular, will fall an easy victim. The records of foundling-hospitals, workhouses, and other public institutions abundantly shew the *especially* injurious influence of impure air during the periods of infancy and childhood. One way in which it increases the mortality of infants is by inducing CONVULSIONS, in consequence of the peculiar irritability of the nervous system at that age. In a paper read before the Medical Section of the British Association in 1834, it was stated on the authority of the Register of the Lying-in-Hospital of Dublin, that in 1781, owing to the impurity of the air in the wards, "every *sixth* child died within nine days after birth, of convulsive disease; and that after means of thorough ventilation had been adopted, the mortality of infants in the five succeeding years was reduced to nearly *one in twenty*." Dr. Andrew Combe, in his Treatise on the Management of Infancy, quotes an equally striking instance from Mr. Maclean's account of his Visit to St. Kilda in 1838. "After remarking that the population of St. Kilda is diminishing rather than increasing, Mr. Maclean states that this unusual result is partly owing to the prevalence of epidemics, but chiefly to the excessive mortality which is at all times going on in infancy. 'EIGHT OUT OF EVERY TEN CHILDREN,' he says, 'die between the 8th and 12th days of their existence!' On perusing this statement, the reader will naturally be disposed to wonder what poisonous quality can infect the air or soil of St. Kilda, to cause such a tremendous destruction of life, and will infer that here, at least, there must be some powerfully deleterious influence at work, which human means cannot successfully cope with. So far, however, from this being the case, Mr. Maclean expressly states, that 'the air of the island is good, and the water excellent;' that 'there is no visible defect on the part of Nature;' and that, on the contrary, 'the great,

if not the only, cause is the filth amidst which they live, and the noxious effluvia which pervade their houses.' In proof of this, he refers to 'the clergyman, who lives exactly as those around him do in every respect, except as regards the condition of his house, and who has a family of four children, *the whole of whom are well and healthy;*' whereas, according to the average mortality around him, at least three out of the four would have been dead within the first fortnight. When it is added, that the huts of the natives are small, low-roofed, and without windows, and are used during the winter as *stores for the collection of manure*, which is carefully laid out upon the floor and trodden under foot till it accumulates to the depth of several feet, the reader will not hesitate to concur in opinion with Mr. Maclean, and admit that had the clergyman's children been subjected to the same mismanagement as those of the other islanders, the probability is, that not one of them would have survived.' " (p. 15.) A passage to the same effect may be quoted from Mr. Chadwick's Report. Speaking of workhouses, schools, &c., he says, (p. 119):— "Since the attention of medical men has been sufficiently directed to the subject, the explanation has become complete of many deplorable cases of general ill health and mortality in such places, attributed at first to deficiency or bad quality of food, or to any cause but the true one,—want of ventilation. A striking illustration of this was afforded in the case of a large school for children during the years 1836 and 1837, as recorded in the 2nd volume of the Poor-Law Reports. Such general failure of health, and such mortality, had occurred among the children as to attract public notice, and the animadversions of many medical men and others who visited the schools; but by most the evil was attributed chiefly to faulty nourishment; and it was only after the more complete examination made by direction of the board, that the diet was found to be unusually good, but the ventilation very imperfect. Suitable changes were then made; and now, in the same space

where 700 children were by illness awakening extensive sympathy, 1,100 now enjoy excellent health.”

I have already shewn the high ratio of infantile mortality in towns generally, and pointed out the fact that Liverpool, in this respect, surpasses all other English towns; 53 out of every 100 children born, dying before the completion of their fifth year. (See Table IV., p. 8.)—The following table shews the proportionate number of deaths from Consumption, and from Convulsions, in Liverpool and in the four other largest towns in England, during the three years 1838–39–40:—

TABLE IX.

Towns.	Total Deaths, (3 Years.)	Deaths by Consump- tion.	Proportion of Deaths from Consumption to		Deaths by Convul- sions and Teething.	Proportion to	
			Total Deaths	Popul. Annly.		Total Deaths.	Popul. Annly.
Birmingham	10,765	1,910	17·74	1 in 207	616	5·72	1 in 645
Metropolis ..	164,420	22,027	13·39	246	11,993	7·29	453
Leeds	13,165	2,316	17·59	209	1,612	12·24	301
Manchester (2 years) *	13,263	2,145	16·17	175	1,765	13·30	213
Liverpool & West Derby	28,109	5,127	18·23	170	4,081	14·51	213
Liverpool (Parish) ..	22,501	4,120	18·31	153	3,328	14·79	190

In the column of Convulsions I have included the deaths from Teething, (665 out of the 3,328 in Liverpool—exactly one-fifth), because “Teething” very generally causes death by Convulsions,—and the disease in that case might be registered under either title,—and because the predisposing cause of death in both cases is the same, *i. e.* excessive irritability of the nervous system. The numbers in this column embrace children, or rather infants, almost exclu-

* In the Registrar-General's Reports, the diseases which caused death in Manchester (excepting Fever and other epidemic diseases) are given for the two years 1839–40, only.

sively, 822 out of 869 deaths in one year from convulsions alone, in the parish of Liverpool, having occurred within the first twelvemonths after birth. It will be observed that in this division of the table the different towns maintain their accustomed positions; the mortality gradually rising from $5\frac{3}{4}$ per cent. of the total deaths, and 1 in 645 of the population in Birmingham, to $14\frac{1}{2}$ per cent. of the deaths, and 1 in 213 of the population in Liverpool and West Derby. In the *parish* of Liverpool it attains its acmé,—1 in 190 of the inhabitants (and, probably, every tenth child under one year old) dying annually of convulsions; while among the 88,000 individuals breathing the purer air of the surrounding district of West Derby, (including, however, Toxteth Park, Edge Hill, &c.) the deaths from this cause are only 1 in 318.

In the first division of the table (Consumption) the usual order is somewhat departed from,—Birmingham giving precedence to London and Leeds, and ranking next to Manchester in point of absolute mortality from this disease, and next to Liverpool as regards relative mortality, *i. e.* the proportion of the total deaths, caused by consumption. Liverpool occupies its usual position, at the foot of the table. In London, the mortality from consumption is $13\frac{1}{3}$ per cent. of the total mortality, and 1 in 246 of the population; in Liverpool and West Derby, it is $18\frac{1}{4}$ per cent. of the deaths, and 1 in 170 of the population, annually. Separating the mortality from this cause in Liverpool from that in West Derby, we find it rise in the former case to 1 in 153, while in the latter it falls to 1 in 238, a ratio very little higher than that which the Metropolis presents.

The seeming anomaly with regard to Birmingham, so startling at first sight, may be explained, in a great measure, by the nature of the occupations in which so large a number of the working classes in that town are engaged. Of these, the process of “dry grinding,” especially needle-pointing, may be mentioned as being particularly apt to induce consumption, from the inhalation of the metallic

particles projected into the air. The Committee of Physicians and Surgeons who reported on the Sanitary State of Birmingham, mention also "the dusty employments of pearl-button making and of the brass-foundry as producing detrimental effects on the air-passages. The process of lackering metals they believe also to be very unhealthy; this proceeding is carried on in hot rooms, the atmosphere of which is extremely impure, generally by young females, great numbers of whom become the victims of consumption." (p. 216.) Were the comparison between Liverpool and Birmingham in this respect confined to females, comparatively few of whom are engaged in these unhealthy processes, the result would be much more favourable to the latter town; for if we contrast the proportionate numbers of male and female deaths, respectively, from consumption, to the total male and female deaths in the two towns, we shall find that in Liverpool the proportion of females to males is as $992\frac{1}{2}$ to 1000, while in Birmingham it is as low as 919 to 1000. So, in a paper published in one of the Journals about three years ago, and written I believe by Mr. Farr, it is stated that the proportion of deaths of females from consumption was "for England and Wales, 1 in 431; for the Metropolis, 1 in 464; for Birmingham, 1 in 404; for Manchester, 1 in 392; and for Liverpool, 1 in 298 (of the female inhabitants); giving an advantage of nearly 56 per cent. in favour of London over Liverpool." It is probable that the deaths from this disease in London are somewhat diminished by the large proportion of the wealthier classes among its inhabitants, whose means enable them to avail themselves of the chance of recovery afforded by removal to a milder climate.—It has been supposed that consumption is particularly prevalent among the factory population, but this idea seems to be discountenanced by the fact of the lower ratio of this disease in Leeds and in Manchester than in Liverpool, where we have only one solitary mill: at all events, whatever influence the absence of this cause may exert, it is more than counter-

balanced by the influence of other causes which are unfortunately present and in active operation.

If the conditions noticed in the former part of this Paper really contribute to the high rate of mortality in Liverpool, we ought to find other large towns (whose rate of mortality is lower) better situated in those respects. And there can be little doubt that such is the case. I shall contrast, in as far as I have the means of doing so, the condition of Liverpool with that of Manchester, whose mortality is the highest, (excepting Liverpool), and of Birmingham, whose mortality is the lowest, of all the large provincial towns in England. A perusal of the evidence taken by the Select Committee on the Health of Towns will satisfy any one that in Liverpool and Manchester—which are the most unhealthy towns in the kingdom—the state of the dwellings of the working classes is also worse than in any other town in England; but that in this respect, as well as in point of mortality, Liverpool is still lower in the scale than Manchester.*

In the first place, LIVERPOOL appears to have a larger amount of *Cellar* population than any other town. After a careful investigation of the cellar residences both here and in Manchester, by the Statistical Society of the latter town, about seven years ago, they estimated the proportion of the working classes inhabiting cellars, in Liverpool, at 20 per cent., in Manchester at $11\frac{3}{4}$ per cent., and in Salford, at only 8 per cent. In BIRMINGHAM, the most healthy of all the large towns, it appears that there are no cellar residents whatever. The Committee of Physicians and Surgeons who drew up the Report on the Sanitary condition of that town state:—"Our inquiries have not enabled us to discover a single example of a cellar used as

* After quoting Liverpool as affording an example of the evils in question in an aggravated form, the Committee state that in Manchester "the habitations of the working classes are described as better than those of Liverpool."—*Report on Health of Towns*, p. x.

a dwelling in Birmingham. We have requested some vigilant officers of police to discover if, in any part of the borough, cellars are used as dwellings; and the result of their inquiries has confirmed our own observations on this point." The cellars in MANCHESTER, while they are not so numerous as in Liverpool, seem to be at the same time less obnoxious in their construction. Mr. Riddall Wood, who examined them in both places, says in his evidence before the Committee on the Health of Towns, "My impression is, that they are not nearly so numerous in Manchester as in Liverpool; *bad as they are, they are of a superior description, as far as light and ventilation go.*" (2210.)

I have not been able to meet with any estimate of the number of individuals inhabiting *Courts* in MANCHESTER, but they appear to be less numerous than in Liverpool. Mr. Riddall Wood, in answer to a question, (2212), "Are there many courts in Manchester?" replies, "Not so many as in Liverpool." Mr. Fletcher, Secretary to the Hand-loom Weaver Commissioners, states, "that sort of construction is less common in Manchester than in Birmingham." (1273.) In BIRMINGHAM, a very large proportion of the labouring classes (not less than 49,016, according to the estimate of the Physicians and Surgeons) reside in courts, or *villages*, as they are termed by the inhabitants; but, although the older courts are described as being "for the most part narrow, filthy, ill-ventilated, and badly drained," they seem, on the whole, to be superior to the courts of Liverpool. The description quoted above does not apply to the newer portion of Birmingham, and with regard even to the old town, Mr. Wood states that in this respect, "as compared with other places, it is much superior." (2278.) But even were it otherwise, there is another point of difference which would prevent the malconstruction of the courts being productive of the same amount of mischief as in Manchester or Liverpool; *i. e. the much smaller number of inhabitants who are pent up within an equal space.* Mr. Wood states, in answer to the question, (2268), "The state of their

dwellings (the humbler classes at BIRMINGHAM) is supposed to be a great deal better than that of the poorer classes at Manchester, and many Lancashire towns?" "Very much better. In the first place, I rarely met with any dwellings at Birmingham in which more than one family resided; each family had a separate dwelling, and they were not let off in flats, as they are in Manchester and Liverpool to a very great extent." And the Committee of Physicians and Surgeons say, "we cannot but believe that the comparative exemption of the inhabitants of this populous town from contagious fever may be in some measure owing, in addition to other causes, to the circumstance of almost every family having a separate house, although a large portion of these houses are situated in courts, and are built back to back." (p. 196.) In MANCHESTER, Mr. Wood says, although "a very large number of the working classes reside in houses with separate rooms in the same house, the majority reside in separate houses." (2319.) I doubt whether this could be said of Liverpool.—In point of general density of population, it will be remembered that Liverpool considerably exceeds all other English towns, having 100,000 inhabitants to the square mile, while Manchester has only 83,000, and Birmingham not more than 33,000 to the square mile.

During the investigation made by the Special Board of Health in MANCHESTER at the time when Cholera prevailed in this country, it was discovered that of 6,951 houses inspected, 2,221 (or nearly one-third) were without *privies*, so that in this respect Manchester is probably little better off than Liverpool. BIRMINGHAM, however, seems to be more favourably situated, for Mr. Riddall Wood, in reply to the question (2287-8), "Did you take notice whether there was attention paid to the privies or cess-pools, or whether they were in a neglected state?" says, "my impression was favourable in respect of Birmingham, as compared with other places."—He makes the same remark in his evidence with regard to the *drain-*

age. "Generally speaking," he says, "the streets and the drainage in BIRMINGHAM are very superior to those in Manchester and other towns in Lancashire." (2269.) "I made frequent inquiries of the inhabitants of the courts, and found much fewer complaints (as respects drainage and sewerage); that may be partly owing to its situation; it is all on inclined planes. Manchester lies on a dead level or nearly so; of course the situation of Birmingham is better." (2279.) "I know there was underground drainage in all the leading streets of the town, and there were soughs lying along the sides of the streets, covered over." (2280.) In like manner the Committee of Physicians and Surgeons say, in their report, "The present sewers are numerous and large, and the principal streets are well drained." (p. 192.) Mr. Hodgson of Birmingham, one of the witnesses examined by the Select Committee of the House of Commons, remarks that "there exists in the town a body of commissioners, possessing considerable powers with reference to the erection of buildings, the sewerage, and so on;" and "that power is extremely well exercised, and becoming more so every day." (2974-5.) In MANCHESTER, the sewerage seems to be much on a par with that in Liverpool, for although Mr. Cobden, in reply to the Select Committee, says (1831), "in those parts of Manchester which are under the management of commissioners appointed for the purpose, I should say the streets are as well cleansed and soughed as any town can be," Mr. Wood gives a more qualified opinion. He says (2216) the state of cleansing and sewerage in Manchester is "decidedly bad; *to say worse than Liverpool, would perhaps be going too far, but quite as bad.*" In a Report of the Commissioners of Sewers which appeared some time ago in the Manchester Guardian, it was stated that the length of streets sewered in the *township* of Manchester was upwards of 22 miles, which gives a ratio to the population somewhat higher than in the case of Liverpool. I have no means of knowing the proportion of sewered streets inha-

bited chiefly by the *working classes* in Manchester or in other towns, but I have no reason to suppose that, with the exception, perhaps, of Birmingham, they are much better situated in this respect than Liverpool. The same intelligent witness whom I have so often quoted, when asked (2238) "Have you any doubt that the state of the poorer classes in those towns in these respects is the cause of a great deal of discontent?" replied, "They have frequently remarked to me, when I spoke about the drains,—that the habitations of the poor and the comforts of the poor were altogether neglected; that the parties who were commissioners, or who had the power of making alterations and drains, and improving the streets, and so on, had taken care of their own property and their own dwellings, and left the streets in which *they* resided almost entirely without such conveniences."

I ought to have mentioned, among the evils requiring remedy in Liverpool, the inefficient system of SCAVENGING and CLEANSING in the streets inhabited by the poorer classes. The visits of the scavengers to these localities are, I fear, like "angels' visits" in more respects than one; none of these streets being visited oftener than once a-week, and a much longer interval frequently intervening. What the practice is in this respect in other places, I do not know; but in the Report of the Manchester Commissioners I observed it stated that during the previous year 13 millions of yards had been swept, and 39,000 loads of sweepings removed. This will give some idea of the quantity of refuse left to contaminate the atmosphere in the neglected districts of this and other large towns. The *Courts*, not being under the control of the Commissioners, are never favoured with the visits of the public scavenger.

Another source of mischief which ought to have been noticed previously, and which I am convinced must contribute its share to the disproportionately great mortality of childhood in Liverpool, is to be found in the state of the

DAME SCHOOLS and COMMON DAY SCHOOLS in the poorer parts of the town. In these schools, where very little is even professed to be taught, and which are frequently held in cellars or in garrets, children are often crowded together, for two or three hours at a time, in numbers which soon render the atmosphere of these ill-ventilated apartments most oppressively close, and prejudicial to the health of the scholars,—an effect which is evidenced by their exhausted looks and languid air after having been an hour or two confined. Mr. Riddall Wood, who spent some time in Liverpool, about seven years ago, in investigating the state of education in the borough, found that there were at that time 244 dame schools with 5,240 scholars, and 194 common day schools with 6,096 scholars. In his Report to the Manchester Statistical Society, he says, “the condition of most of the schools in an extensive and populous district, stretching upwards from the North Shore to Scotland Road, is wretched in the extreme, corresponding in a remarkable manner with that of the population. With few exceptions the dame schools are dark and confined; many are damp and dirty; more than one-half of them are used as dwelling, dormitory, and school-room, accommodating in many cases a family of seven or eight persons; above 40 of them are cellars.” “Of the common day-schools in the poorer districts,” (he states in another part of his Report), “it is difficult to convey an adequate idea; so close and offensive is the atmosphere in many of them as to be intolerable to a person entering from the open air, more especially as the hour for quitting school approaches. The dimensions rarely exceed those of the dame schools, while frequently the number of scholars is more than double. Bad as this is, it is much aggravated by filth and offensive odour arising from other causes.”* Mr. Wood states that the masters and mistresses were generally ignorant of the depressing and unhealthy effects of the atmosphere which surrounded

* See *Report of a Committee of the Manchester Statistical Society, on the State of Education in the Borough of Liverpool*, in 1835-36.

them, and he mentions the case of the mistress of a dame school who replied, when he pointed out this to her, that "the children thrived best in dirt!" He notices particularly a school in a garret up three pair of dark, broken stairs, with forty children in the compass of 10 feet by 9; and where, "on a perch forming a triangle with the corner of the room sat a cock and two hens; under a stump-bed immediately beneath was a dog-kennel, in the occupation of three black terriers, whose barking, added to the noise of the children and the cackling of the fowls on the approach of a stranger, was almost deafening. There was only one small window, at which sat the master, obstructing three-fourths of the light it was capable of admitting." In Manchester, so far as I can judge from the Report of the Committee of the Statistical Society, the schools for the working classes, especially the day schools, are somewhat better than those in Liverpool, although the dame schools are described as being "deplorably bad." "Neither in Manchester nor Liverpool was there a common day or dame school, where there was a play-ground, where the children could get the change necessary for young persons." (2231.) In Birmingham, Mr. Wood stated to the Committee on the Health of Towns that "taken as a whole, the state of the dame schools was much better than in Liverpool and Manchester." They were "small rooms, but generally on the ground floor, and not, as in Liverpool and Manchester, frequently in cellars or garrets." (2300.)

What has been already stated with regard to the high rate of mortality amongst us, and its physical causes, applied to Liverpool as a whole: but I have now to show that the mortality is distributed over the parish in very different proportions, and to point out in how far any connexion may be traced between the ratio of mortality in each district and the particular degree of intensity with which those physical causes may there be found to operate. The subsequent Tables have been constructed with the view of facilitating

the illustration of this important point. The materials from which they have been framed were derived from the enumerators' lists of the late census, with which I was favoured by Mr. Eckersley; the returns of the Corporation Surveyors with regard to the court and cellar residences; the map published by the Commissioners of Sewers; the records of the Dispensaries; and a list of the deaths in the different Registrar's districts of the parish, for two years, (1838 and 1842), with which I have been obligingly furnished by the Superintendent Registrar. The first Table contains merely some of the facts from which the others have been calculated.

TABLE X.

WARDS.	Population 1841.	Population Resident (1840) in			Fever cases 5 years, 1835-39.	Population, July 1, 1837.
		Courts.	Cellars.	Courts and Cellars.		
Vauxhall	*26,146	11,585	3,253	14,838	4,346	23,849
Saint Paul's	18,002	5,209	1,981	7,190	1,615	16,766
Exchange	17,769	3,975	2,491	6,466	2,955	15,493
Castle Street	9,691	1,829	570	2,399	955	9,168
Saint Anne's	18,882	5,588	1,983	7,571	1,078	17,136
Lime Street	18,848	4,079	900	4,979	480	17,514
Scotland	35,613	10,628	3,166	13,794	1,867	28,729
Saint Peter's	9,533	1,589	499	2,088	673	9,394
Pitt Street	15,263	1,742	2,103	3,845	1,108	14,166
Great George	19,645	4,590	1,337	5,927	1,863	17,700
Rodney Street	15,202	2,567	903	3,470	265	12,491
Abercromby	†15,899	2,153	982	3,135	264	12,651
	220,493	55,534	20,168	75,702	17,469	195,057

* Exclusive of Northern Hospital (80), but including Borough Gaol (536), and Night Asylum (110).

† Exclusive of Workhouse (1,643), and Infirmary, &c. (320).

I have stated here the estimated population on 1st July, 1837, (as well as the population enumerated in 1841), that being the mean term of the five years, 1835–39, from which the annual average of fever is to be deduced. The court and cellar population was enumerated about six months previous to the taking of the census, so that the proportion of inhabitants of courts and cellars in the different wards will be a fraction higher than the numbers here given would indicate. I have no means of stating the proportions of different diseases which have caused death in the various wards, but as a substitute, I have given the number of patients with Fever,—one of the principal diseases of the poor,—attended at their own houses by the officers of the North and South Dispensaries, during the five years from 1835 to 1839 inclusive.

The next Table shews *the per centage of the population of the different districts who are resident in Courts and Cellars, with the proportion of the entire population of each district annually attended with Fever by the Dispensaries, and the annual rate of mortality from all causes in each of the corresponding districts, in the years 1838 and 1842.*

TABLE XI.

WARDS.	Per centage of Population in			Fever cases to tot. Ward Population Annually.	Total Deaths. Average of 2 years.
	Courts.	Cellars.	Courts and Cellars.		
Vauxhall	45·44	12·76	58·20	1 in 27·44	1 in 23·50
Saint Paul's	24·74	11·33	36·07	37·66	30·67
Exchange					
Castle Street					
Saint Peter's	18·10	9·00	27·10	56·51	31·36
Pitt Street					
Great George					
Saint Anne's	26·22	7·83	34·05	109·30	31·51
Lime Street					
Scotland	31·28	9·32	40·60	77·02	31·74
Rodney Street	15·98	6·38	22·36	237·18	41·62
Abercromby					

In stating the deaths, I have been obliged to group together several of the wards, as the registration returns do not show the deaths for each ward separately, but merely for the different registrars' districts into which the parish is divided, and which, excepting in two instances, include more than one ward.

It will be observed that Vauxhall Ward, where the largest proportion—more than one-half—of the population, reside in courts or cellars, is also the ward in which Fever is most prevalent, 1 in 27 of the inhabitants having been annually attended by the Dispensaries alone; while in Rodney Street and Abercromby Wards, where this disease prevails the least, (only 1 in 237 of the inhabitants having been attended,) there is also the smallest proportion of the population—between one-fourth and one-fifth—resident in courts and cellars. The same connexion will be found to subsist between the proportion of court and cellar population and the prevalence of fever, in the other districts, with the exception of Scotland Ward and St. Anne's and Lime Street Wards, where the cases of fever are considerably below the ratio of the court and cellar population. Nearly the same remarks apply to the rate of mortality in the different districts, 1 in $23\frac{1}{2}$ of the inhabitants of Vauxhall Ward dying annually, while in Rodney Street and Abercromby Wards the proportion is only 1 in $41\frac{1}{2}$. Scotland Ward is again an exception, standing next to Rodney Street and Abercromby in point of mortality, while in the amount of court and cellar inhabitants it ranks next to Vauxhall. But St. Anne's and Lime Street present nearly the same ratio of mortality as of court and cellar population. Although fever is not of frequent occurrence in these wards, the general mortality is as high as we should expect to find it. But it is to be remembered that the proportion of court and cellar population is suggested as merely *one* element of mortality out of several which are exerting a constant influence; and where so many causes are at work, each pulling, as it were, a different way, and tending to derange the calculation, it is not to be expected that, when we attempt to shew

the influence of a single element, the result should be so uniform as we might expect to find it were that element the *only* one in action. People do not die merely because they inhabit places called *courts* or *cellars*, but because their dwellings are so constructed as to prevent proper ventilation, and because they are surrounded with filth, and because they are crowded together in such numbers as to poison the air which they breathe. Thus, although in Scotland Ward, where the ratio of fever and of mortality is comparatively low, a large proportion of the population inhabit courts or cellars, it may happen that those courts and cellars are of a superior construction, or that they are less filthy, or that their inhabitants are less densely crowded together; any one of which circumstances would account in some measure for the exception presented by the present Table.

The next Table shews the *comparative character of the Courts in the different districts of the town, with the relative prevalence of Fever among the court population, and*

TABLE XII.

WARDS.	Fever cases in Courts.	Per centage of Courts.		Total Deaths.	Inhabitants per house in Courts.
		Open.	Closed.		
Vauxhall)	1 in			1 in	
Saint Paul's)	25·69	25·77	33·39	} 28·00	5·46
Exchange)	21·42	2·15	63·66		5·68
Castle Street)					
Saint Peter's)	28·08	17·29	28·94	31·36	5·51
Pitt Street)					
Great George)	98·64	30·38	36·28	31·51	5·11
Saint Anne's)					
Lime Street)					
Scotland)	57·92	38·41	15·24	31·74	4·96
Rodney Street)	108·64	23·88	3·88	41·62	4·31
Abercromby)					
	37·01	24·11	31·73	* 30·95	5·19

* The years 1838 and 1842 were the two years of lowest mortality since the Registration Act came into force, the average mortality of

the relative mortality of each district. The last column gives the average number of inhabitants in each of the court-houses.

Here again it will be observed that the Fever cases were the most numerous among the inhabitants of those courts which were the worst ventilated; 1 in $21\frac{1}{2}$ of the population of the courts in Exchange District having been affected, while in Rodney Street District, where the courts are of the best construction, the inhabitants were affected in the smallest ratio—only 1 in $108\frac{1}{2}$ having been attended with Fever. With the exception, again, of St. Anne's and Lime Street, the same relation will be observed between the character of the Courts, and the prevalence of Fever among their inhabitants, in the intermediate districts. And here we find one circumstance which will help to explain the comparative exemption from Fever, and low mortality, of Scotland Ward; for although so many of the inhabitants reside in courts, it appears that a larger proportion of those courts have a free ventilation, being open at both ends, than in any other district; and, with the exception of Rodney Street and Abercromby Wards, a smaller proportion are closed. In this Ward, where 1 in 58, only, of the residents in Courts are annually attacked with Fever, 38 per cent. of the Courts are entirely open, and not more than 15 per cent. entirely closed; while, in Exchange and Castle Street Wards,—the annual ratio of Fever being 1 in $21\frac{1}{2}$,—the open Courts form only $2\frac{1}{8}$ per cent., and the closed $63\frac{3}{8}$ per cent. of the whole number.—The general mortality of the districts corresponds with the character of the Courts in each, for although St. Anne's and Lime Street Wards have a larger proportion of closed courts than the Pitt Street district, whose mortality is a shade higher, they have also a considerably larger proportion of open courts, so that in this respect the two districts may be considered to be on an equality.

Liverpool for the last *five* years being, as already stated, 1 in 28·75. So that the average *absolute* mortality of the different districts is somewhat higher than it appears in the above Table, which gives, however, a pretty correct idea of their *relative* mortality.

A similar connexion is observable between the density of the population of the Courts (in so far as the average number of inhabitants per house is a test of that), and the Fever and Mortality in the various Wards.—This column exhibits another fact, explanatory of the apparent anomaly with reference to Scotland Ward in Table XI., viz. that with regard to density of population in its Courts, it is more favourably situated than any of the other districts, excepting Rodney Street and Abercromby. St. Anne's and Lime Street rank next to it, and this may help to counteract the unfavourable influence which the number and character of their courts would otherwise exert; for although the difference may appear small when the average merely is stated, it is to be remembered that where the aggregate of houses in a district is of large amount, it requires a considerable number of densely-peopled Courts to raise the average of each house in a perceptible degree; and on the other hand that a low comparative average, though it may not strike the eye, is a pretty sure proof that there are not a great many crowded houses in the district.

The records of the Dispensary do not enable me to furnish the same precise information with regard to the *comparative frequency of Fever among the cellar population* of the different Wards, nor indeed am I enabled to state with any accuracy the proportion of Fever treated in Cellars throughout the Parish generally. But from an average of several hundred cases of this disease attended by myself, chiefly at the north end of the town, and by Mr. Higginson, who has kindly favoured me with the particulars, at the south, I have calculated, as stated in my Report to the Poor-Law Commissioners, that the cellar population yields 35 per cent. more of Fever than it ought to yield, as compared with the total working population. That is to say, if the whole of the working population of Liverpool lived in cellars, 135 cases of Fever would appear among them for every 100 which now occur.

The following Table shews that *the proportion of damp*

and wet Cellars is greatest, and least, in the same districts, respectively, where fever reaches its maximum and minimum; and that the three most unhealthy districts generally, are the most unfavourably, while the three comparatively healthy districts are the most favourably, situated in this respect; the proportion of damp and wet cellars in the former being $44\frac{1}{2}$ per cent., and in the latter $28\frac{1}{2}$ per cent. of the whole. Other diseases are probably also more prevalent in cellars, for the total number of Dispensary patients residing underground is certainly much larger than the cellar proportion of the working classes should give; but, that fever especially infests these abodes, is shewn by the fact (so far as a few hundred cases can be trusted to for the purpose) that while of every 100 Dispensary patients of all descriptions attended by Mr. Higginson and by myself, 31.22 per cent. resided in cellars, there were 36.22 in cellars out of every 100 cases of *Fever*.

TABLE XIII.

WARDS.	Per centage of Damp Cellars.	Inhabitants per Cellar.	Total Fever.	Total Deaths.
Vauxhall	43.83	3.03	1 in	1 in
Saint Paul's			34.06	27.02
Exchange	59.34	3.18	32.81	29.60
Castle Street				
Saint Peter's	53.37	3.87	56.51	31.36
Pitt Street				
Great George				
Saint Anne's	34.47	2.99	109.30	31.51
Lime Street				
Scotland	35.44	3.25	77.02	31.74
Rodney Street	19.16	3.36	237.18	41.62
Abercromby				

The small ratio of inhabitants per cellar in St. Anne's and Lime Street Wards will be noticed as another power in counteraction to the influence of their comparatively numerous court population.

In the next Table is given the *proportion of sewered streets* among those inhabited chiefly by the working classes, with the proportion inhabited by other classes, and the total proportion of sewered streets, in the various districts :—

TABLE XIV.

WARDS.	Per centage Length of Sewered Streets.			Total	Total
	Working Classes.	Other Classes.	Total.	Fever.	Deaths.
Vauxhall	15	58	30	1 in 27·44	1 in 23·50
Saint Paul's . Exchange ... Castle Street.)	20	59	41	37·66	30·67
Saint Peter's.) Pitt Street ... Great George)	24	65	48	56·51	31·36
Saint Anne's.) Lime Street..)	6	50	43	109·30	31·51
Scotland	23	48	35	77·02	31·74
Rodney Street) Abercromby .)	25	59	53	237·18	41·62
	20	57	44	55·80	30·95

The prevalence of fever and the rate of mortality proceed inversely as the efficiency of sewerage, excepting in Scotland and St. Anne's districts, where the operation of this element is masked by the interference of alleviating causes. It should be noticed, also, that in St. Anne's and Lime Street Wards there are many streets occupied chiefly by "other classes," but where there are courts and cellars, in which the "working classes" of course reside. I am inclined to look upon the absence of sewerage—although certainly one element of mortality—as less influential in its action than some of the others which have been noticed. At the same time, there can be no question as to the importance of an effective system of sewerage carried into the heart of the densely-peopled localities inhabited by the working population.

Table XV. exhibits the influence of perhaps the most important element of all,—*density of population*. It has been already shewn that Liverpool, in the aggregate, is the most densely-peopled town in England; we have now to see in what particular localities it is that the people are gathered together in such numbers as to give rise to this peculiarity.

TABLE XV.

WARDS.	Square yards to one Inhabitant.	Fever cases to Population.	Total Deaths.	Average Inhabitants per House.
Vauxhall }	19·50	1 in	1 in	7·42
Saint Paul's }		34·06	27·02	
Exchange }	17·26	32·81	29·60	7·82
Castle Street }				
Saint Peter's }	25·49	56·51	31·36	7·67
Pitt Street }				
Great George }				
St. Anne's }	24·86	109·30	31·51	6·00
Lime Street }				
Scotland }	46·03	77·02	31·74	6·39
Rodney Street }	57·78	237·18	41·62	6·03
Abercromby }				
	30·70	55·80	30·95	6·83

On examining this Table, we observe that, with the usual exception of St. Anne's district, fever and density of population advance, step by step, from Rodney Street and Abercromby, where they are both at their minimum, to Exchange Ward, where they reach their culminating point (13·45 square yards). The general mortality follows the same course, excepting in Vauxhall district, where it is higher than in Exchange and Castle Street Wards, although the ratio of condensation is somewhat less. The disturbing elements in this case are, probably, the very large proportion of court and cellar population in Vauxhall Ward (58·20 per cent. of the inhabitants), and the deficient sewerage;—

in both these respects, as well as in point of mortality, the Vauxhall district being the worst of the six. But although its mortality appears higher, the proportion of *fever* is a shade lower—on the average of the five years—than in Exchange Ward; the numbers being 1 in 27·44 of the inhabitants annually in Vauxhall, and 1 in 26·21 in Exchange. This is a curious fact, and one worth inquiring into. It would be interesting to ascertain what are the causes of the very high rate of mortality in Vauxhall Ward,—the causes, I mean, medically speaking,—*i. e.* the diseases which carry off so many of the inhabitants. This could only be done by an examination of the registers, to the accomplishment of which, I believe, obstacles exist. It is not unlikely that much of the excess of mortality would be found owing to the two other scourges of Liverpool, *i. e.* convulsions among children, and consumption among adults; and that the higher ratio of fever in Exchange Ward may be explained by two other circumstances, *viz.*, the inferior *character* of its courts, which are the worst in the town, not less than 69 per cent. being closed at both ends, while only $2\frac{1}{2}$ per cent. are open,—and the very large proportion of *Irish* among its population, amounting as it does, probably to three-fourths of the whole. On this subject, I shall say more immediately.—To understand the apparent discordance of the two facts that fever is more prevalent in one district, and the mortality higher in the other, it must be borne in mind that all diseases are not equally fatal. Only one individual, for instance, dies of fever out of every 10 or 15 attacked, while many more will die out of the same number attacked with convulsions or consumption; and the circumstances which predispose to fever may not be identical with those which bring on convulsions or consumption. Overcrowding, combined with defective ventilation, is known to be *especially* favourable to the existence of the former disease, and we have seen that in Exchange Ward both these causes act with the greatest intensity. In Exchange Ward, there are only 13·45 square yards to each

inhabitant ; in Vauxhall there are 22·35 : in the former, more than two-thirds of the courts are closed at both ends ; in the latter less than one-fourth are of this construction. We have seen also that it is in these overcrowded and ill-ventilated *courts* of Exchange Ward that fever is principally found ; for while the difference in the ratio of the *general* population of the two wards annually attacked with fever was only as 1 in 26·21 to 1 in 27·44, the difference in the ratio of the *court* population so attacked was as 1 in 18·96 to 1 in 25·21.

The average number of inhabitants per house appears, by the Table, to be higher in Pitt Street district than in Vauxhall ; but this may be partly explained by the fact that many of the front houses inhabited by the working classes in the former district are of a larger size than those in the other districts, and of course accommodate a greater number of families or of lodgers. In many instances these houses were formerly occupied by persons engaged in business, who gradually deserted them as the town moved eastward. The high average in this district, however, must be partly owing to the crowded state of some of the small court-houses, particularly in Great George Ward.

This Table again shews influences at work to counteract the effect of the large amount of court and cellar population in St. Anne's and Scotland districts, the former presenting a lower average of inhabitants per house than any other district ; while, in point both of general density of population, and of average per house, Scotland Ward stands next to Rodney and Abercromby, which are the most favourably situated as regards the first, and are nearly on a par with St. Anne's and Lime Street with reference to the second.

Let us now return for a moment to Exchange Ward, and the prevalence of fever there. I formerly mentioned that, in a particular locality of the town, the inhabitants are congregated together in the ratio of 657,963 to the geo-

graphical square mile : that district is situated in Exchange Ward, and it is to it that I wish to call your attention. It is bounded by Addison Street, Marybone, Johnson Street, Dale Street, and Byrom Street, with Great Crosshall Street running through its centre, and has a superficies of about 105,000 square yards. In this small district are presented nearly all the evils on which I have dwelt, in an aggravated form. It has the largest amount of cellar population, the greatest number of damp cellars, the courts are of the worst construction, the sewerage is more defective than in any part of the town with the exception of some portions of Vauxhall Ward, few of the front houses have privies or ash-pits, most of the streets and courts are the filthiest in the town, and density of population here reaches its highest point. The district contained, in 1841, 1,531 houses, and 11,860 inhabitants; giving a ratio of 8·91 square yards to each inhabitant, and 7·74 inhabitants per house. As might be expected, it is here that fever has its favourite abode; 503 cases, out of a population of 10,853, having been attended annually by the Dispensaries, on an average of five years; *i. e.* 1 in 21·57 of the entire population was attacked yearly. That portion of the district bounded by Addison Street and Great Crosshall Street contained, in 1841, 811 houses and 7,938 inhabitants, on about 49,000 square yards,—giving the ratio which I mentioned, of 657,963 to the geographical square mile.* Excluding Byrom Street, the number of square yards to each inhabitant was 6·23, and of inhabitants per house, 8·33. But if we take a single street of this portion of the district, Lace Street—which, when I was in the habit of visiting it four or five years ago, was unquestionably the worst street in Liverpool—the result will be still more striking. The street has 1,434 inhabitants in 109 houses, 51 of which are situated in courts, (13·15 per house), and has, including the houses, an area

* In Exchange, Vauxhall, and St. Paul's Wards, there is a population of 62,003, condensed in the ratio of 260,438 per geographical square mile. The maximum density of London, according to Mr. Farr, is "nearly 243,000 to a geographical square mile."

which gives only about four square yards to each inhabitant. In this street, 1 in 9·87 of the inhabitants was *yearly* attacked with fever—on the average of five years!* Of 58 front houses, 51 are without either privy or ash-pit. The effect of this absence of necessary conveniences is seen in the state of the courts, and of the entries and back passages connected with them, which may be more easily imagined than described.—Next to Lace Street, in all that is abominable, ranks North Street, (in the Dale Street division of the district), which has seven square yards to each inhabitant, 10 inhabitants per house, and more than three-fourths of its front houses unprovided with out-offices. Nothing can exceed the filth of some of its courts. Here about 1 in 7 of the inhabitants were fever patients yearly.—The only streets in Vauxhall Ward which at all approach to Lace Street and North Street in filthiness, and in the other particulars I have mentioned, are Oriel Street, off Vauxhall Road, and Stockdale Street, off Marybone. Oriel Street had, about five years ago, 1,585 inhabitants on an area giving six square yards to each; 41 out of 50 front houses had no place of deposit for refuse, while the cellars under many of the inhabited houses in courts were used as receptacles for manure and various kinds of filth. The annual ratio of fever was about 1 in 11 of the inhabitants.

Before ascertaining the relative mortality of the different wards, I felt little doubt that Exchange Ward would show the highest rate of mortality, from my knowledge of the peculiar condition of the district which I have described. One or two circumstances have been mentioned, which probably contribute to the higher rate of mortality in Vauxhall Ward; but I still think it likely that if the deaths in the Lace Street district could be separated from those in the rest of Exchange Ward and in St. Paul's Ward, with which they are associated in the returns, the mortality

* Attended at their own houses by the Dispensary officers alone; *i. e.* exclusive of children brought to the Dispensaries, as well as of club-patients, and those attended by private practitioners.

in that district would be found to be at least as high as it is in Vauxhall Ward.

In the south division of the town there is an analogous district, not nearly so bad as the Lace Street district, but bearing the same relation to the remainder of the southern division as the Lace Street district does to the northern end of the town. It is situated in Great George Ward, and includes the streets between St. James' Street and the docks, extending from Crosbie Street on one side to New Bird Street on the other. In these streets there are 11,915 people, with 10·35 square yards to each, and 7·88 inhabitants per house. One in 30·67 of the inhabitants was attended annually with fever. The three worst streets of the district are Crosbie Street, Brick Street, and New Bird Street, which contain in the aggregate about 4,600 inhabitants, a large proportion of whom are Irish. Crosbie Street affords only seven square yards to each of its 1,544 inhabitants, and New Bird Street only about six to each of 1,835 inhabitants. Of the 339 houses in these two streets, 209 are situated in courts, and only 130 to the front of the street. The average number of inhabitants per house is 9·08 in New Bird Street, and 11·27 in Crosbie Street. It was in this street that the court was situated which is mentioned in page 20, as having had nearly one-half its inhabitants treated for fever, by the Dispensary, in a single year. The ratio of fever for the street generally, was 1 in 16·79.

The Irish poor are especially exposed to the operation of the 'physical causes' of fever. "It is they who inhabit the filthiest and worst-ventilated courts and cellars, who congregate the most numerously in dirty lodging-houses, who are the least cleanly in their habits, and the most apathetic about everything that befalls them." Accordingly, it is a well ascertained fact that, wherever they are found, they are attacked with fever in a larger proportion than the native inhabitants of Great Britain. It may be said that this is merely the result of their greater poverty,

which deprives them of a proper supply of the necessaries of life, and compels them to select the most unhealthy (because the cheapest) localities as their places of residence. To a great extent this is true; but at the same time there appears to be, among the lowest classes of Irish, such an innate indifference to filth, such a low standard of comfort, and such a *gregariousness*, as lead them, even when not *driven* by necessity, into the unhealthy localities where they are found to congregate; and which they render still more unhealthy by their recklessness and their peculiar habits.* This idea is confirmed by Mr. Baker, Surgeon and Inspector of Factories at Leeds, from whose report on the sanitary condition of that town, I quote the following remarks:—† “Whether it is the improvidence of the Irish character, or their natural habits are filthy, or both, or whether there exists the real destitution which is apparent in their dwellings, I know not; but in them is more of penury, and starvation, and dirt, than in any other class of people which I have ever seen. The proverbial misery of the poorer Irish people is not overlooked, nor indeed is it apparently without reason; but whether that misery is the result of improvidence or not, is another question altogether; for *the average amount of labour which they obtain in Leeds is evidently quite equal to that of the English labourers.*” He then gives a table of the wages of a large number of Irish weavers and their families, in the months of November of ten successive years (1831–40), and of Oct. 1841; and goes on to say, “The average rate of wages of the labouring classes of England scarcely exceeds this; and it

* “Nor does the evil stop with themselves. By their example and intercourse with others they are rapidly lowering the standard of comfort among their English neighbours, communicating their own vicious and apathetic habits, and fast extinguishing all sense of moral dignity, independence, and self-respect. * * I am persuaded that so long as the native inhabitants are exposed to the inroads of numerous hordes of uneducated Irish, spreading physical and moral contamination around them, it will be in vain to expect that any sanitary code can cause fever to disappear from Liverpool.”—*Local Reports on the Sanitary Condition of the Labouring Population of England.*—‘Liverpool;’—pp. 293–4.

† *Local Reports on the Sanitary Condition of the Labouring Population of England.*—‘Leeds;’—p. 392.

is presumed, therefore, that the statement is borne out, that were the habits of the Irish settler made more provident by sanitary regulations—regulations affecting his dwelling, his means of livelihood, and his indifference to personal and local cleanliness, and by the example of his English neighbours—that his character would cease to be what it has long been, viz. an expression of desolation and misery; that he would not be so often found the recipient of parochial and general charity, but might possess the same independence which his English neighbours possess, and that the destitution and mortality of towns might be materially reduced.”*

In conformity with what has been said, the districts of Liverpool, where we have seen fever to be most prevalent, are exactly those where the Irish are congregated in the greatest numbers, viz. the Lace Street district in Exchange Ward, and the Crosbie Street district in Great George Ward. In Lace Street, about four years ago, where 1 in 9·87 of the inhabitants was yearly attacked with fever, 87·22 per cent., or seven-eighths of the entire population, were Irish; in North Street, 1 in 7 of the inhabitants being fever patients, yearly, the proportion of Irish among its population was 85·11 per cent., or six-sevenths of the whole.

* Dr. Davidson, in his Thackeray Prize Essay, gives the following Table of the cases admitted into the Glasgow Fever Hospital from May 1st to November 1st, 1839, “to shew that filthiness in personal habits is very frequently connected with the production of typhus.”

	Filthy.	Clean.	Total.
Scotch	173	157	330
Irish	158	107	265
English	6	6	12
West Indies, &c. ..	3	1	4
	340	271	611

The proportion of filthy patients is greatest among the Irish, being nearly 60 per cent.; while about 52 per cent. of the Scotch are classed as filthy.

In Crosbie Street, it was stated not long ago by the Rev. Mr. Parker, of St. Patrick's Chapel, that 1,196 of the inhabitants (about 80 per cent.) were Roman Catholics; which will give a tolerably correct approximation to the number of Irish resident in the street.—The greater liability of the Irish to attacks of fever is more directly proved by the following facts, thrown into a tabular form, shewing the ratio which the proportion of Irish *fever* patients, out of the *total* number of Irish patients attended by the Dispensaries, bears to the proportion of English fever patients out of the total number of English patients. The numbers comprise only the *medical* cases attended by the officers of the North Dispensary, during nine months of the year 1838:—

	Total Medical Cases.	Fever Cases.	Per centage of Fever Cases.
English.....	2,428	637	26·07
Irish	1,836	601	32·73

The Irish fever patients formed $43\frac{1}{4}$ per cent. of the whole fever cases attended; but in a district comprising Exchange and Castle Street Wards, and a few adjoining streets of St. Paul's and Vauxhall Wards, they amounted to not less than $54\frac{1}{2}$ per cent.

If the facts which have been now brought forward are really what they profess to be, they are surely calculated to arrest the attention of all who are interested in the welfare of the community. If they are incorrect, let the error be pointed out, for the materials from which they have been drawn are open to the investigation of any one who may feel inclined to dispute their accuracy. This remark is necessary, because it seems that there are still some who cling to the notion that Liverpool is one of the most healthful towns in England, and that to say otherwise is to libel the "good old town." Since our last meeting, when the former part of this Paper was read, I have heard, from more than one gentleman, remarks to the following effect,—that "it was *impossible* the mortality in Liverpool could have been so high as stated;" that "there must be some mistake about

the matter, or if the mortality had really been so high, it must have been owing to some accidental circumstance ;” and that “the courts of Liverpool were not so very bad after all,” &c. &c. I repeat, therefore, that what has been stated as to the high rate of mortality among us, is not matter of *opinion*, but matter of *fact*, about which there can be no dispute, however much the causes which I have suggested for the fact may be open to discussion.*

Not the least striking result of the investigation is the very different rate of mortality which we have found going on in the various districts of the town ; for while in Rodney Street and Abercromby Wards, with upwards of 30,000 inhabitants, the mortality is below that of Birmingham—the most favoured in this respect of the large towns of England,—in Vauxhall Ward, with a nearly equal amount of population, the mortality exceeds that which prevails in tropical regions. In Rodney Street and Abercromby Wards, 100 persons die annually out of 4,162 ; in Vauxhall Ward, 2,350 persons are sufficient to furnish the same number of deaths, leaving an excess of 1,812 persons engaged in furnishing additional deaths at this high rate of mortality. In other words, 177 persons die annually in Vauxhall Ward for every 100 dying out of an equal amount

* [During the discussion which ensued, in the Literary and Philosophical Society, on the reading of this Paper, it was suggested that the unusually large proportion of deaths to the living might be partly explained by the number of emigrants passing through Liverpool on their way to foreign countries, and by the number of sailors belonging to the port. But it is well known that the fluctuating character of a population does not, in itself, affect the ratio of mortality, provided the average numbers throughout the year remain the same, or are not augmented beyond the ordinary rate of increase of the community in question ; and provided the strangers who arrive in the town are equally healthy, on the average, with those who leave it. With regard to the first of these points, it must be remembered that the census was taken during the height of the season of emigration, when the number of emigrants enumerated must have been more than proportioned to the number of deaths they furnished throughout the year ; and with regard to the second point, it may be safely asserted that the health of the emigrants arriving here (chiefly from rural districts) is much superior to the average health of the inhabitants of Liverpool, of whom not less than 1 in 15 is constantly sick.—An objection of the same nature was lately urged by a member of the Town Council,* who said that Liverpool had been

* See Liverpool Mercury, April 28, 1843.

of population in Rodney Street and Abercromby Wards. Should not this simple fact be sufficient to arouse the attention and stimulate the exertions of the most indifferent? It is calculated that about 1,500 lives are annually lost by shipwreck, on the British coast, and not a single wreck occurs without exciting a large amount of public sympathy. These lives are lost by the decrees of Providence—by causes which perhaps no human foresight could avert; and yet we look idly on, while, on a small spot of that coast less than two square miles in extent, hundreds of our fellow townsmen perish, yearly, by causes which in a great measure it is within our power to remedy or remove. And here I must again beg to guard myself from the chance of its being supposed that I hold the defects which have been noticed, as chargeable with the *whole* of the excess of mortality in Liverpool, or of the excess of mortality in one district of Liverpool over another. Part of the excessive mortality of Vauxhall Ward over Rodney Street and Abercromby Wards must be ascribed to the different character of the population of the two districts, (although in this last nearly one-fourth of the inhabitants reside in courts or cellars, *of a superior construction*); and if it can be established that in other towns, where the mortality is lower,

“unfairly dealt by” in the Report on the Sanitary condition of England; that “a large proportion of deaths among the poor arose among parties who came into the town ready to perish;” that “the Irish came here sick, and died, and parties came down from the country sick, made this a back door to Ireland, and died here.” Now, there can be no doubt whatever that much of the excessive mortality in Liverpool is due to the Irish *resident here*, but there can be equally little doubt that the number of Irish *leaving* Liverpool in bad health much exceeds the number of those who *arrive* here in a similar predicament. Irish patients at the Dispensary frequently date their illness from their arrival in Liverpool, (a confirmation of the noxious influence of our courts and cellars); and when attacked with fatal diseases (particularly consumption), many of them return to Ireland, in the expectation that “the air of their native country” will restore their health.—The same gentleman is reported to have said that the high rate of infantile mortality was owing to the “great difficulty in getting them (the Irish) to vaccinate their children.” This explanation is sufficiently refuted by the fact that the deaths from small pox in Liverpool, since the Registration Act came into force, have been fewer than in Manchester, where the general mortality is less,—the relative numbers being 1 in 522 of the population annually, in Liverpool, and 1 in 501 in Manchester.]

the labouring classes have a greater command of the necessaries of life,—then there can be no question but that this must be held sufficient to explain part of the extraordinary mortality of Liverpool. Of course no one but a Utopian dreamer can expect, that—where there is such a wide difference in the command of the necessaries of life as must always exist between one section of the community and another—any sanitary regulations will succeed in reducing the mortality of the poor to the same level with that of the wealthier classes; but after making every allowance of this kind, will any candid mind refuse to admit that, in the case of Liverpool, a large balance must still remain to be charged to the account of the physical causes which have been pointed out? Does any one suppose that if the inhabitants of Rodney Street and Abercromby Square were to exchange places with those of Vauxhall or Exchange Wards, leaving their spacious mansions to be occupied by the inhabitants of the latter district, while they took up their residence in the filthy and miserable courts and cellars of Vauxhall or Exchange,—their relative command of the necessaries of life remaining undisturbed—does any one suppose that the relative mortality of the two classes would likewise remain unaltered? that 1 in 23 would still die in Rodney Street, and not more than 1 in 41 in Vauxhall? or that the average duration of life would not be prolonged beyond 15 years among the former inhabitants of Vauxhall, and fall far below 35 years among the present occupants of Rodney Street?

That the influence of these seats of pestilence is not confined to those who reside within their immediate limits, but extends itself to the whole town, poisoning the atmosphere which all classes are compelled to breathe, is shewn by the fact that the excess of mortality, as compared with other towns, is found to affect the highest as well as the lowest classes of the community. This appears from the following Table, compiled from Mr. Chadwick's Sanitary Report on England, (pp. 158–161):—

TABLE XVI.

Towns.	Average Age at Death.			General Average.
	Gentry and Professional Persons.	Tradesmen.	Labourers, &c.	
Kendal	45 yrs.	39 yrs.	34 yrs.	36 yrs.
Bath	55 „	37 „	25 „	31 „
Four Metropolitan Unions....	44 „	28 „	22 „	25 „
Leeds	44 „	27 „	19 „	21 „
Bolton	34 „	23 „	18 „	19 „
Manchester	38 „	20 „	17 „	*18 „
Liverpool	35 „	22 „	15 „	17 „

So that *all* classes of the inhabitants are interested in effecting an abatement of the evils with which Liverpool is afflicted.

Having shewn that the prevalence of fever and the rate of mortality, in the different districts of Liverpool, bear a general relation, 1st, to the proportion of the population resident in courts and cellars; 2ndly, to the *character* of the courts, as admitting of free ventilation or otherwise; 3rdly, to the state of the sewerage; 4thly, to the density of population—in each district; it only remains to state the steps which have been already taken to abate the evils in question, and to point out what still remains to be done. When I speak of steps already taken, I refer to the Act “for the promotion of the Health of the Inhabitants of Liverpool” which obtained the Royal assent on the 18th of June, and came into operation on the 1st November last. Notwithstanding its defects and omissions—which I shall proceed to notice, in connexion with its principal provisions—there is no doubt that, *if strictly enforced*, the new law

* Mr. Chadwick states the average age at death in Manchester to be 20, (p. 176, *note*), but a calculation founded on the data furnished by himself (pp. 162–164) yields an average of only 18, as stated in the Table.

will effect a very great improvement in the character of the dwellings in future to be erected for the use of the working population.

I shall first notice the provisions affecting *ventilation*; and afterwards the clauses relating to *privies, ash-pits, drains, &c.*

I. THE MINIMUM WIDTH OF STREETS AND COURTS IN FUTURE TO BE BUILT, IS FIXED AT 24 FEET FOR THE FORMER, AND 15 FEET FOR THE LATTER.

These minima would be unobjectionable, had the maximum height of the houses been fixed at the same time. But the principle on which the width has been fixed is erroneous, or rather it has been fixed on no principle at all. The obvious principle which should regulate the minimum width of the space separating two opposite rows of houses, is, that it should bear a certain specified relation to the height of the houses. As the law at present stands, there is nothing to prevent any builder, who may be more anxious about the amount of his profits than the health of his tenants, from erecting houses four or five stories, or more, in height, and letting each apartment to a separate family; or, what would be worse, allowing them to be occupied as common lodging-houses. A Court containing eight or ten such houses, teeming with human beings,—closed at one end, and having its entrance narrowed to six feet by privies and ashpits,—would present within itself elements of ill-health and of mortality, whose agency an intervening space of 15 feet between the opposite houses would be perfectly inadequate to counteract. The lowest minimum width suggested by any architect examined by the Select Committee on the Health of Towns, was two-thirds of the height of the houses, while several thought that the opposite rows should be separated by a space equal to the *whole* height of the houses, and that in no case should this space be less than 20 feet. Were the minimum of two-thirds adopted, the average width of the majority of our present Courts would be probably about 16 feet.

II. ONE END OF THE COURT MAY BE ENTIRELY BUILT UP, AND THE ENTRANCE MAY, IF THE HEALTH COMMITTEE SHALL THINK PROPER, BE NARROWED TO SIX FEET IN WIDTH, FOR THE ERECTION OF PRIVIES AND ASH-PITS,—SUCH ERECTIONS NOT EXCEEDING 10 FEET IN HEIGHT.

These provisions are extremely objectionable. A Court can never be thoroughly ventilated unless *both* ends are open; and it is to be hoped that the Health Committee will never “think proper” to exercise the power which the act has unfortunately given them, of allowing the entrance—the only point where fresh air can gain access to the court—to be blocked up by privies, and receptacles of excrementitious matter.

III. EVERY HOUSE HEREAFTER TO BE BUILT SHALL HAVE AT LEAST ONE ROOM ON THE GROUND FLOOR, CONTAINING 108 SUPERFICIAL FEET, (INCLUDING ONE CHIMNEY-BREAST AND FIRE-PLACE); AND NO ROOM SHALL BE LESS THAN EIGHT FEET IN HEIGHT, EXCEPT ATTIC ROOMS, WHICH MAY AVERAGE SEVEN FEET FROM THE FLOOR TO THE CEILING.

Theory would require that the maximum number of inmates allowed to occupy each room of given dimensions should be fixed; but it would be difficult, if not impossible, to apply this rule to practice. As it is, we may still have eight or ten or twelve individuals sleeping in a space of 864 cubic feet, or less than the space allotted by the Prison Inspectors to *each* inmate of our public gaols.

IV. EVERY ROOM SHALL HAVE AT LEAST ONE WINDOW NOT LESS THAN FIVE FEET HIGH, AND THREE FEET WIDE, OR HAVING AN AREA OF NOT LESS THAN FIFTEEN FEET, CLEAR OF THE SASH-FRAME, EXCEPT ATTIC AND CELLAR WINDOWS, WHICH MUST BE AT LEAST THREE FEET SQUARE, OR HAVE AN AREA OF NOT LESS THAN NINE FEET, CLEAR OF THE SASH-FRAME. THE WINDOWS MUST OPEN ON HINGES OR PIVOTS, UNLESS THE SASHES ARE MADE SO AS TO OPEN BOTH AT THE TOP AND BOTTOM.

This clause is altogether unobjectionable; and it is only to be regretted that so little inducement has been given to the occupiers of court-houses to take advantage of it, by the scanty provision made for the circulation of fresh air throughout the court.

V. CELLARS IN COURTS ARE NOT TO BE OCCUPIED AS DWELLINGS.

The abstract of the act does not state whether this clause applies only to cellars in courts hereafter to be erected, or whether it includes, also, cellars in courts which were completed previously to the 1st of November, 1842. If the

latter be the case, the clause is certainly not enforced, for I can point out many cellars in courts, which at the present time are occupied as dwellings.

VI. AFTER THE FIRST OF JULY, 1844, NO CELLAR IS TO BE OCCUPIED AS A DWELLING-PLACE, WHICH CELLAR SHALL BE LESS THAN SEVEN FEET IN HEIGHT, "OR WHICH SHALL BE LESS THAN ONE-THIRD OF ITS HEIGHT ABOVE THE LEVEL OF THE STREET, OR OTHERWISE SHALL NOT HAVE TWO FEET AT LEAST OF ITS HEIGHT FROM THE FLOOR TO THE CEILING ABOVE THE SAID LEVEL," WITH AN OPEN AREA OF TWO FEET WIDE FROM THE LEVEL OF THE FLOOR UP TO THE LEVEL OF THE STREET, OR WHICH SHALL NOT ALSO HAVE A WINDOW OF NOT LESS THAN THREE FEET SQUARE, OR OF AN AREA OF NOT LESS THAN NINE FEET CLEAR OF THE SASH-FRAME.

It is impossible to conceive for what purpose the alternative of two feet above the level of the street has been here introduced, as that must be, *in every case*, less than the other alternative given, of one-third of its height. It is pretty clear that the lawyers have made a mistake. The clause, however, when it comes into operation in July next year, will unquestionably (*if it be really acted on*) throw out of occupation a large proportion of the cellars which are at present inhabited, unless they be so altered as to comply with the provisions of the act. It is to be feared that the alternative height of two feet above the level of the street will operate injuriously in this way amongst others; *i. e.* by allowing cellars which are at present six feet high, and have one-third of their height above the level of the street, to be brought within the requirements of the act, by merely lowering the floor one foot. It may be doubted whether the health of their inhabitants would be promoted by the alteration, which alteration would not have sufficed to make the cellar conform to the act had the condition of one-third of the height above the street been the only one proposed.* This clause should have fixed the minimum height of the *top of the door*—as well as that of the ceiling—above the level of the street, for much of the facility with which air gains access to the cellar will

* The Physicians of the Infirmary and Dispensary, in their Report to the Town Council in 1802, recommended that no cellar should be allowed to be inhabited, the ceiling of which was not three feet at least above the curb-stone round the doorway.

depend upon this circumstance.—The state of the floor has been overlooked. It should have been made a condition of cellars being allowed to be inhabited, that the floor should be either flagged or boarded, according to circumstances, for many of the present cellars, as I formerly stated, have nothing but the bare earth for a floor.

VII. INNER OR BACK CELLARS, LET OR OCCUPIED ALONG WITH FRONT CELLARS, ARE TO HAVE A VENTILATING CHIMNEY, EXCEPT IN THE CASE OF HOUSES BUILT BEFORE THE COMMENCEMENT OF THE ACT.

So that the occupants of the 1,617 back cellars, previously existing, are to be allowed to die off as fast as they please, and to have their places supplied by fresh victims *ad infinitum*.—Wherever practicable, a window should be opened in these back apartments, so as to give a direct communication with the external air; and where this cannot be done, a tin tube, opening by a wide mouth from the ceiling and terminating in the chimney or flue of the front cellar or of the room above, might have the effect, to a certain extent, of ventilating these close and gloomy abodes.

The only provisions in the act which relate to privies, drains, &c., are the following:—

I. OWNERS OF HOUSES ARE TO PROVIDE PRIVIES AND ASH-PITS FOR THE SAME, AND TO KEEP THEM IN REPAIR. NO CELLAR IS TO BE INHABITED AFTER FIRST JULY, 1844, WHICH SHALL NOT HAVE ATTACHED TO IT THE USE OF A PRIVY AND AN ASHPIT.

The proportion of privies, &c. to a given number of houses, should have been stated, for, without some enactment of this kind, an owner might keep clear of the penalties of the law by providing two privies for 100 houses.

II. PRIVATE DRAINS, PRIVIES, AND CESS-POOLS, &c., ARE TO BE CLEANSED BY THE OCCUPIERS OF HOUSES, UNDER A PENALTY OF ANY SUM NOT EXCEEDING FIVE POUNDS, AFTER FOURTEEN DAYS' NOTICE FROM THE SURVEYOR.

It is easy to foresee that, in the case of the majority of the occupiers of court-houses, this clause will be perfectly ineffectual; for, even if the magistrates were disposed to levy the penalties from the poor occupiers, by distress, the whole value of the furniture in their houses would frequently

fall short of the amount. Besides, in the case of drains, privies, &c., common to a number of houses, there would be endless disputes among the occupiers as to whose duty it was to undertake the task. A better arrangement would be, to make this duty fall upon the owners.

III. THE OWNERS OF COURTS AND PASSAGES ARE TO FLAG THEM, AND KEEP THE FLAGGING IN REPAIR; THEY ARE REQUIRED TO LAY WITH STONE AN OVER-GROUND DRAIN OR CHANNEL, AND TO CAUSE THEIR HOUSES TO BE DRAINED TO THE SATISFACTION OF THE HEALTH COMMITTEE.

An underground drain would be much preferable to the proposed gutter, were it not for its liability to become choked, and the difficulty which would be found, in practice, to the removal of the obstruction. The proviso with regard to the draining of the court-houses is much too vague; and no provision whatever seems to have been made for the draining of houses situated elsewhere than in Courts.

IV. HOUSES IN A FILTHY AND UNWHOLESOME CONDITION MAY BE CLEANSED BY ORDER OF A MAGISTRATE, AT THE EXPENSE OF THE OCCUPIER, WHO IS LIABLE TO A DISTRESS IN DEFAULT OF PAYMENT OF THE CHARGES OF SUCH CLEANSING.

This clause, which is copied from the Metropolitan Police Act, has been found quite inoperative in London, for the reasons assigned in predicting the failure of the clause relating to the cleansing of privies, &c.; and we may safely assert that it will be equally ineffectual here. It is difficult to suggest any remedy which is not open to objection, excepting, perhaps, the enforcement of a periodical white-washing, &c., by the owners.*

It will be seen that the act is almost entirely prospective, no remedy being attempted (except in the case of the cellars), for the evils previously existing. But something surely might be done, and ought to be done, to improve the condition of the large body of the working classes

* Clauses 26, 27, 28, prohibit interment in *graves* in burial-grounds within the borough, unless 2 feet 6 inches of soil be left above the coffin, and below the ordinary surface of the burial-ground. This space (2½ feet) is much too small in old-established burial-grounds. It is to be hoped that interments within the precincts of towns will soon be altogether prohibited by Parliamentary enactment.

already suffering from these injurious agencies; for it is to be remembered that if nothing be attempted, the destructive influence of these agencies will not be confined to the present generation, but will be exerted throughout all future time, at least so long as the present residences of the labouring population continue in a habitable state. *While these residences remain in their present condition, Liverpool can never be a healthy town.*

Of the 1982 Courts within the Parish, 629 are closed at both ends; and with these the Act does not attempt to interfere. But these Courts, in their present state, are quite unfit for the habitation of human beings; and why should not power be obtained to purchase and pull down the house, or wall, or building—whatever it may be,—which obstructs one end of the Court, and thus open a communication with the external atmosphere. After all, the Court would be imperfectly ventilated. A great improvement would be effected, also, in the health of some of the densely peopled parts of the town, by opening them up, and intersecting them with wide and airy streets, so as to form a substitute for those parks and squares which it seems impracticable to introduce into the heart of a fully-peopled town. An instance has been already mentioned, (p. 23,) where a measure of this kind was attended with a favourable effect in Liverpool, and in other places it has been found equally beneficial. From a paper published in the Philosophical Transactions for 1782, it appears that the rate of mortality in York had diminished from 1 in $21\frac{3}{4}$ in 1735, to 1 in $28\frac{1}{4}$ in 1781; and this great improvement was ascribed chiefly to the fact that many of the streets had been widened by pulling down old houses which almost met in the upper stories, so as nearly to exclude the sun and air from the streets and lower apartments, and to additional drains having been made, and other measures taken to promote the cleanliness of the city.

The Common LODGING-HOUSES—those fruitful sources of mischief—ought to be subject to regulation and inspection by the public authorities. No one should be

permitted to keep a house of this kind unless he have previously received a license from the magistrates, who should fix the maximum number of lodgers allowed to sleep in each house, and in each room of the house; the number being of course proportioned to the cubic contents of the space they are to occupy. No house should be licensed whose construction does not admit of the most thorough ventilation, nor which is situated in a Court, unless the court be open at both ends. All lodging-houses should undergo periodical cleansing; but perhaps the present Act gives the Magistrates sufficient power to enforce this, where necessary.

The DAME SCHOOLS, and COMMON DAY SCHOOLS, which are productive of the same physical evils in a less aggravated degree, should also be subject to license and inspection. Nor, even should this measure have the effect of diminishing the number of scholars, need any fear be entertained that the cause of education would suffer from the circumstance; for in nine cases out of ten, the children are sent to the dame school merely in order to be out of the way of mischief, and not with the hope or expectation that they will learn anything useful; and were it otherwise, "the generality of the teachers, both of the Dame and Day Schools, are wholly incompetent to the task of instruction, and their ignorance, on the most common topics, is lamentable,"* although the masters themselves, according to the Committee of the Manchester Statistical Society, "have generally a better opinion of their own qualifications for their office. One of them observed, during a visit paid to his school, that there were too many schools to do any good; adding, 'I wish government would pass a law that nobody but *them as is high larnt* should keep school, and then *we* might stand a chance to do some good.'"† (Report on Manchester, 2nd edit. p. 7.)

* *Report of Manchester Statistical Society, on the State of Education in the Borough of Salford.*

† "One poor old body, who was some time in reducing the school to sufficient silence for conversation, having succeeded, at last, in modera-

As there is a separate Sewerage Act for Liverpool, the "Improvement Act" says nothing on the subject of Sewers. But an attempt should be made to direct a portion of the funds annually levied from the inhabitants, to the sewerage of the poorer streets, where it is so loudly called for, but which have hitherto been so much neglected. Any one consulting the map published by the Commissioners of Sewers, will see that in Rodney Street Ward alone, upwards of a mile and a half of sewers have been laid down in unfinished streets, which are wholly uninhabited, and in most of which not a single house is erected. The funds so expended would have much more than sufficed for the effectual sewerage of the whole of the notorious and neglected district in Exchange Ward, with its population of 12,000 inhabitants, which I mentioned at our last meeting. I was glad, however, to hear on that occasion, from our President (Dr. Tattershall), that the Commissioners had determined to devote, immediately, some part of their attention to the class of streets in question.

A change in the construction of the Sewers would make them much more extensively useful than in the mere removal of the surface-water, to which they are at present almost confined. Were they properly trapped, and fitted up with cast-iron flushing gates, the experience of the Holborn and Finsbury district has shewn that the sweepings of the streets and other refuse matter might be carried off without any inconvenience to the inhabitants, and with an ultimate saving of expense. It has been found that the ordinary flow of water in the sewers, accumulating behind

ting the disorder, remarked: 'If I can keep a bit of quietness, it's as much as I can do,—and' (*emphatically*) 'as much as I am paid for.'

"In one school, an affirmative answer being given to the question,—'Do you teach Morals?' one of the elder girls was called up, and the question was put, 'Can you tell me what is your duty to your parents?' She replied, with a vacant stare, 'No!' The Mistress, a little discomposed, interfered thus: 'No!—Why can't you say, No, Sir!' Then moderating her voice, and apparently perfectly unconscious of the answer being discreditable, otherwise than by the omission of 'Sir,' she observed: 'I am sure I take care o' their morals, as well as I can; but you see, sir, they are such uncultivated beings, it takes time to learn 'em how to say Sir to a gentleman.'"—*Report on the State of Education in Salford*, p. 8.

the flushing-gates, is sufficient, when the gates are opened, to sweep off the deposit which might otherwise take place.* No town can be better situated than Liverpool for this purpose, seated as it is on undulating ground, and washed by a broad river with daily tides, which would immediately carry off into the ocean the refuse matter discharged from the sewers.

Mr. Chadwick, in his Sanitary Report on Great Britain, (pp. 44-54), proposes to prevent the accumulation of the noxious contents of cess-pools and privies, &c., in the poorer districts of large towns, by carrying them off at once through properly constructed drains into the common sewers. For this purpose, water-closets and water-tanks are to be substituted for the present privies and cess-pools; and he states that the cost of the whole of the apparatus, (£10 8s. 6d.), including the drain, would be "a reduction of the mere cost of cleansing in the old method." In the poorer districts of Liverpool, however, the cleansing is, in most cases, gratuitously, but very inefficiently and irregularly, performed by the night-men. If the pollution of the river were thought an insuperable obstacle to this plan, he proposes that the sewers should be continued to the country at proper distances, where the contents of the cess-pools, &c., might be distributed as manure, by irrigation; which, high authorities concur in stating to be "the best means for removing quickly, and constantly, and the least injuriously, the matters which can only remain for removal by any other process at the expense of the public health;" and which "would also be the most productive mode of distributing the manure." The value of the manure annually produced, in this way, in Liverpool, would probably be £30,000; and the nitrogen contained in it would be sufficient to fertilize 300,000 acres of land.

* Were this found not to be sufficient in dry weather, provision might be made for the overflow from the Canal, or for a supply of water from the reservoirs proposed to be erected under the Watering Act, to be directed into the Sewers at stated intervals. It is stated that in the Holborn and Finsbury district, the expense of the necessary alteration of the sewers would be repaid in seven years, by the saving which would thus be effected in the cleansing of the streets and sewers.

However sound and scientific Mr. Chadwick's views may be, they will probably be thought inapplicable to the present circumstances of Liverpool. But, at all events, every ash-pit should be made to communicate with the sewer by a guarded drain, so as to carry off at once the fluid portion of its noxious contents: the poisonous effluvia from the remainder would then act with diminished power. Additional advantage would be gained by causing every ash-pit to be effectually covered over.

In connexion with sewerage, I would suggest, in addition, that no cellar should be allowed to be inhabited unless situated in a street that is sewered, and where the sewer is below the level of the cellar floor; and every such cellar should have a properly constructed drain, communicating with the sewer.

Lastly, I would suggest that the very inadequate supply of privies should be remedied by the establishment of public buildings, distributed over the town in numbers and situations regulated by the wants of each locality, *i. e.* by the number of houses in each district, found to be destitute of these necessary conveniences.

I cannot conclude without expressing my regret, that, in this country, the public health should occupy such a very subordinate place in the estimation of the public authorities. In this respect, we are far behind our continental neighbours. In France and other countries on the Continent, the promotion of the public health is a constant object of solicitude, both with the government and the municipal councils. Nor is any important matter bearing upon this point decided on without the sanction and concurrence of the best professional and scientific opinions, which are previously sought for by the Minister of Public Works. In Paris, there is a Council of Health, appointed by the Prefect of Police; and to this body, as well as to the Academy of Medicine, questions of medical police are constantly referred by the Central Government. In

this country, however, when matters of that kind *are* taken up by the public boards, as in the case of sewerage, or of the Act whose provisions we have been discussing, the propriety of consulting those whose education or peculiar pursuits would render their advice of value, seems seldom to occur to any of the parties concerned. It is known, for instance, that much of the efficiency of sewers depends upon the form of their sides and bottoms, which should be curved, and not flat; as well as upon the mode of junction of the branches with the main trunks. It is probable that no engineer would now sanction the junction of sewers at angles, particularly right angles, as is the case with most of the Liverpool sewers. A good deal depends even upon the radius of the curve with which they pass from one street to another. Nor can it be doubted that if the Town Council had consulted any medical practitioner acquainted with the poorer districts of the town, previously to applying to parliament for the "Improvement Act," that Act would itself have been greatly improved.* The present Council has degenerated, in this respect, from the practice of their predecessors forty years ago, for "in the beginning of the year 1802, the Corporation of Liverpool, being about to apply to Parliament for powers to improve the streets and the police of the town, requested the Physicians of the Infirmary and Dispensary to suggest to them 'such alterations as might contribute to the health and comfort of the inhabitants,' in order, that where necessary, they might include in the Bill about to be brought into Parliament, the powers requisite to carry such alterations into effect. The Physicians took this request into serious consideration, and presented a report of considerable extent, including a view of the causes of the uncommon sickness of the two preceding years, and of the measures requisite to prevent its recurrence,

* I was informed, by a member of the Health Committee, that it was proposed to consult the Officers of the Dispensaries, on the occasion referred to; but that the proposal, for some reason or other, was negatived.

and to remove the frequency of contagion in the habitations of the poor.”* With this view they recommended the removal of slaughter-houses, and all other offensive trades or manufactories, the consumption of smoke, the enforcing of cleanliness in the streets, a general review of the common sewers, and other measures of a like nature. But in a more especial manner, they directed the attention of the Town Council to the habitations of the poor, noticing particularly the evils connected with the inhabited cellars and courts. With regard to the former, they say, “The vast number of persons that occupy such dwellings, and the impossibility of finding other habitations, forbid us to hope that any recommendation for preventing them from being generally inhabited, could be attended with immediate effect. But a general survey should be made of these subterraneous dwellings, and such means adopted for promoting their salubrity as circumstances require and admit.” They then specify the alterations which they deem necessary, and recommend that “in regard to all houses to be built in future, powers should be obtained to prevent the cellars from being inhabited at all, except they be constructed according to the plan just pointed out.” The report here mentions a few places in which, from local circumstances, the cellars are particularly obnoxious, and advises, that as soon as possible, they should be emptied of their inhabitants, and filled up. It proceeds as follows: “The habitations of the poor in the greater part of the small and narrow courts, back from the streets, are equally objectionable in point of health, as in the cellars. It is much to be lamented that such a form of building should have grown into general practice. * * Powers should be obtained for preventing ground from being occupied with buildings of this description in future; and the proprietors of courts already built, might be compelled to give them the ventilation of a thorough draught of air, which would, in general, be obtained with little difficulty. If any

* *Currie's Medical Reports*, 4th edit., vol i., pp. 371-2.

courts are permitted to be built in future, it should be on condition that they be made of a certain width; that the entrance should not be through an arch-way; that the houses should not be above two stories high; and that the upper end of the court should be kept open. Every court should have two or more necessaries, according to its size, and a plentiful supply of water."

Dr. Currie adds, that "every attention was paid to this memorial by the gentlemen of the Common Council of the Corporation, and in the draught of the bill proposed to be brought into Parliament, such clauses were introduced as were necessary to enable them to carry into effect the various regulations recommended to their notice. But the interests of different individuals being affected, difficulties have arisen in procuring that general assent, so desirable in all such applications to the legislature. The measure is however in progress, and it is not to be doubted, that by the exercise of candour and patience, every obstacle will be removed, and that the public good will triumph over all inferior considerations."

Dr. Currie's expectations were not realized. Inferior considerations triumphed over the public good. Had it been otherwise, and had the rate of mortality in Liverpool been thus reduced to that in Birmingham, nearly 40,000 lives would have been saved in the parish of Liverpool, during the interval which has elapsed since these recommendations were offered to the notice of the Common Council. Could the rate of mortality *now* be reduced to that of Birmingham, 1,250 lives would be *annually* saved.



