TUBERCULOSIS AND THE MASS RADIOGRAPHY SERVICE IN THE COUNTY OF LANARK

1940 - 1963

BY

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COUNTY OF LANARK

LANARKSHIRE.

"From the medieval colour, pageantry, and frolic of Lanimer Day when the garlanded statue of William Wallace looks down from his eyrie on the crowning of the schoolgirl Queen and on the cheerful crowds that throng the ancient streets of Lanark, right on to the strenuous toil of the workers in the furnaces whose nightly glare incarnidines the dun skies of Motherwell and Coatbridge the many sided life of this great Scottish County offers an arresting variety of interest both to the reflective resident and to the alert and enquiring visitor."

From the Official Handbook:
"Industries and Attractions
of Lanarkshire."

In discussing the problem of tuberculosis in Lanarkshire and in tracing the development of the mass radiography service since its inception in 1944, it is desirable that some account be given of the scene of operations - the "Black County." Tuberculosis has been described as a "social disease with medical aspects." It is right therefore that we should consider those aspects of the social and industrial environment which are relevant to the epidemiology of tuberculosis and that we should say something about the geography of the County and the system of local government administration in order to put into perspective the difficulties of running a mass radiography service in general and of organising and planning in particular an intensive two-year mass X-ray campaign.

(A County Council map on the scale ½ inch to the)
(mile is provided.)

Lanarkshire lies partly in the central industrial belt of Scotland and partly in the hills and valleys of the Southern uplands. Its longest stretch extends for 52 miles in a north-west to south-east direction and its/

its widest stretch embraces 33 miles in an east-west direction. Its area is 860 square miles. The ancient name Clydesdale conveys an apt picture of Lanarkshire for the river Clyde traverses practically the whole length of the County and receives as tributaries most of its rivers and streams.

Being one of the most highly populated and industrial areas of Scotland, the landscape of the County presents a remarkable contrast. The northern half of the County lies in the industrial heart of Scotland where dwell the vast proportion of the population, inclusive of the burghs, of some 573,000 people. In this region all the evidence of industry thrusts itself upon the eye - the fires and blast furnaces, the tessellated cranes and gaunt stacks, the squat hour glass cooling towers, the chequered pattern of factory sheds, the coal bings and slag heaps of iron and steel works like pock marks on the countryside, and interlacing the hives of industry a network of railway lines and marshalling yards. By contrast the southern half of the County contains vast stretches of rich arable land and fine pasture for the common breeds of cattle and sheep although the Ayrshire and Blackface respectively are predominant. Here too is some of the most picturesque pastoral scenery in Scotland. Whether in the fresh greenness of spring or in the golden hues of autumn, the stretch of road, river and vale down Clydeside from Lanark is as pleasant to the eye as any in the land; and soon after the blossom appears the gentle slopes of this valley become the orchard of Scotland. Apart from the two small burghs of Lanark and Biggar the population of this region is widely dispersed in the innumerable villages, hamlets and farms.

There are 37 parishes and each has its own contribution to make to the daily life and economy of the County. Ten of the parishes in the upper ward have a population density of less than 50 persons to every square mile; six/

six of them have less than 25. At one extremity the rural parish of Dunsyre has less than 10 persons to the square mile, while at the opposite end the industrial parish of Rutherglen has over 11,000.

Five rural parishes, Dunsyre, Dolphinton, Wandel and Lamington, Walston, and Pettinain have altogether only 1,100 inhabitants in more than 55 square miles whereas the five Large Burghs, Rutherglen, Hamilton, Coatbridge, Airdrie, Motherwell and Wishaw have some 230,000 persons crowded into 22 square miles. Crawford, the parish largest in area, is so extensive that it could contain Lanarkshire's whole population of over half-a-million at a lower density than that obtaining in any of the Large Burghs.

INDUSTRIES.

Lanarkshire has an industrial tradition dating back to the Industrial Revolution. The basic heavy industries of coal, iron and steel and their ancillary industries have been the corner stone of the County's economy. Iron ore deposits are now worked out and the coal reserves have diminished over the years. In 1888 Lanarkshire contributed 58 per cent of Scotland's total output of coal; today it is around 15 per cent. In 1920, 62,000 colliers were employed in 210 pits. A decline began in the early thirties and successive annual returns record fewer pits and fewer miners in Lanarkshire. In 1954 only 15,000 miners were employed in a total of 78 collieries.

Despite the exhaustion of native sources of iron and coal, the steel industry of the County is a vigorously expanding one and the mills in the County are among the largest sources of supply in the United Kingdom. The industry's growth in the County coincides with that of Colvilles Ltd. over the period since 1870. Mention should be made of the new strip steel mill at Ravenscraig, Motherwell, where the planned production of sheet steel is some 675,000 tons per year and this can be stepped up to 2,000,000 tons per year. It is estimated that the total output of crude steel from all Colville's Works in the County will reach a figure around 3,300,000 tons per year, that is, double the entire Scottish steel output in 1939. In addition the ready supply of fine and crude steel from the furnaces of Colvilles has brought into existence in the last thirty years a vast number of light steel industries; the latter are grouped mainly in the industrial estates of which more will be said later.

In nearly all the towns of the industrial northern half of Lanarkshire are/

are to be found firms engaged in engineering. Many have specialised interests - equipment for iron and steel works, for quarries and collieries, structural and agricultural engineering, bridges, oil tanks, cranes, prefabricated steel houses, aero-engines, plant for atomic energy stations, and a whole range of domestic utensils. The Motherwell Bridge and Engineering Company has recently entered the field of nuclear engineering with important contracts at Dounreay and Hunterston power stations. Also in Motherwell and Wishaw are firms making railway waggons, passenger coaches and motor coach bodies.

A number of American firms have become established in the County. One might mention Cummins Diesel Engine Company at Shotts, Caterpillar Tractor Company, and Renco Ltd. at Tannochside, Sunbeam Electric Ltd. in East Kilbride, and Honeywell Controls Ltd. at Newhouse.

The name of Stewarts and Lloyds is world famous for steel tubes. There are three factories in the County at Coatbridge, Bellshill, and Tollcross, respectively. At Burnbank a firm specialises in the manufacture of bolts, rivets, nuts, wire ropes and chains, while in the rural towns of Lanark and Strathaven agricultural implements and machinery are the order of the day. Finally mention should be made of the arrival of two of Britain's motor manufacturers to the East and to the West of the County, B.M.C. at Bathgate, Rootes at Linwood.

The history of Lanarkshire is that of coal, iron and steel, of the men who worked them, and of the conditions under which they lived and laboured.

MINING.

Lanarkshire forms part of the central coalfield of Scotland. The coal worked is mainly bituminous rather than anthracite and this partly accounts for the much lower incidence of pneumoconiosis in our miners as compared with those in South Wales coalfields.

The coal industry in Lanarkshire as in Scotland as a whole has been declining since the end of the first World War. In 1920 there were 200 productive mines within the County boundary. Now there is less than 10 per cent of that number. In the mid thirties annual coal output ranged around 12,000,000 tons. In recent years output has fallen to around 2,000,000 tons per year. Many and diverse are the reasons advanced for the loss of productivity in our coalfields. Many of the older miners say the coal is there and can be worked. At any rate the loss of native supplies of coal is nothing to the effect on human lives of unemployment, displacement and uprooting men who learned the job of mining in youth and now in advancing years have to learn new skills. Before the end of the present decade the manpower in Lanarkshire pits will have fallen to between 8,000 and 15,000 men in less than 15 pits. Thousands of miners and their families have left their native hearth to find work in other coalfields such as those in Fifeshire and the Lothians but even here the cold blast of an hostile economy is stifling an age old industry.

In the Lanarkshire of the past fifteen years, Oliver Goldsmith's poem the "Deserted Village" has a familiar ring. Coal bings overgrown with vegetation, derelict pit-head gear, dilapidated miners' rows are silent witness to once thriving communities. One could enumerate countless examples of/

of "Deserted Villages." The parish of Bothwell, which has had a population of over 60,000 for the past 50 years, employed 12,764 men in the pits in 1924; by 1953 this number had dropped to 640. The village of Law which has a population of 1666 once boasted 10 collieries with a daily output of 2,000 tons of coal. Today there is not one pit.

THE INDUSTRIAL ESTATES.

Broadly speaking, the County's light industries are concentrated in the industrial estates and on other subsidised factory sites. In 1939 the first Lanarkshire estates were developed at Carfin, Chapelhall and Larkhall, areas hard hit by exhaustion of coal seams. In the post-war years further estates have grown up in Blantyre, Newhouse, Coatbridge and East Kilbride. To all these centres has come a variety of new industries, for example, aeronautical engineering represented by Rolls Royce, electrical engineering, telephones, typewriters, fractional horse-power motors, car accessories, chemicals, medical drugs and hormones, and mass produced clothing.

The number of men and women who work in these factories controlled by Scottish Industrial Estates is in the region of 40,000. Though employing more women than men, these factories established in areas formerly hard hit by the decline of heavy industry are providing people young and old alike with new opportunities and new skills.

POPULATION.

In 1961 the census return disclosed that 571,407 persons were resident in Lanarkshire. At the 1951 census the population was 524,596 persons. The intercensal increase is largely attributable to the rapid growth of the new town of East Kilbride.

The population of Lanarkshire represents 11 per cent that of all Scotland. The landward area with a population of 334,348 persons represents 6 per cent that of all Scotland; herein are the two small burghs of Lamark and Biggar which collectively house 9,840 persons; the largest non-burghal parish in Scotland, Bothwell, with a population of 63,193 persons; the largest "village" in Scotland, Cambuslang, with a population of 26,335, persons; the second largest "village" in Scotland, Blantyre, with a population of 16,854 persons; and the first new town to be built in Scotland, East Kilbride, with a population at present of some 38,000 persons. The town was granted burgh status on 16th May, 1963. In the industrial heart of the County are the five large burghs of Airdrie, Coatbridge, Motherwell and Wishaw, Rutherglen, and Hamilton. Their aggregate population at the 1961 census was 227,219 persons.

The bulk of the Population in the landward area are living in urban rather than in rural communities. Indeed only some 55,000 persons live in purely rural areas.

The population of Lanarkshire has grown much more rapidly than that of Scotland as a whole. Between the census of 1801 and the present day Scotland's population has trebled whereas Lanarkshire's population has increased by eightfold its 1801 level. The industrial parish of Dalziel has shown the most spectacular increase of population from 611 in 1801 to over 40,000 today, a seventyfold increase.

Lanarkshire is often associated only with slag heaps, coal bings, belching chimneys, smoke and grime, noise and bustle. In fact this is only one half of the picture. The other half is that of a large and vigorous farming community and a market garden industry second to none in Scotland.

The herd of cattle amounts to over 100,000 head - the fourth biggest cattle population of any Scottish county. About 29 million gallons of milk flow from the dairy farms. The milk production is the second highest in Scotland. The entire stock are attested.

There are nearly 250,000 sheep of all kinds and the County is the home of the Blackface breed.

About four fifths of the total acreage is taken up by crops, grass and rough grazings - quite a sizeable proportion for a region traditionally associated with industry. Oats, wheat and barley are the chief crops.

Poultry plays no small part in the County's economy. A flock of some 380,000 is kept and rates among the biggest north of the border. The same can be said of pigs whose population figures are close to 30,000.

Lanarkshire is a stronghold of the market garden industry. About half the glass houses in Scotland are situated here; the County provides two thirds of the total tomato crop of Scotland. The Clyde Valley has always been the main fruit producing area of Scotland. Nature has blessed this stretch of Clyde with rich soil, sun trap glades and shelter from the rigours of winter.

RELIGION

As in so many things so in matters of religion, Lanarkshire shows considerable diversity of persuasion. 75 per cent of the population is Protestant with almost every denomination and sect represented. 24 per cent is Roman Catholic, the proportion varying from 5 per cent in rural communities to 50 per cent in the large burgh of Coatbridge. The remaining 1 per cent is non-Christian/

non-Christian, Humanists and Marxists.

LOCAL GOVERNMENT.

More than most places Lanarkshire has seen the ebb and flow of the main political creeds both in national and in local government. Labour holds ascendancy at present.

It is interesting to reflect that Lanarkshire was the cradle of socialism in Scotland; the first experiment in Communism in Britain was conducted by Robert Owen at New Lanark; Scottish Nationalism does not lack its supporters in the County, and the Liberals are not without their enthusiasts too particularly in the southern rural areas of the County.

In respect of local authority health services, the County Council is responsible for the landward area which includes the new town of East Kilbride and the two small burghs of Lanark and Biggar, and also for those health services in the 5 large Burghs which come under the jurisdiction of the Education Authority. In the provision of health services for all age groups there has always been co-operation in the most practical and friendly way between the County Council and the Burgh Councils.

In the landward area matters of more local public concern are administered by the District Councils of which there are 9. The District Councils as are the Burgh Councils represented on the County Council.

EAST KILBRIDE.

East Kilbride came into existence as a result of the New Towns Act of 1946. It was to be the first modern new town in Scotland, planned and administered by a Development Corporation. The aim of the Corporation was "To build a complete new town for the accommodation of some 45,000 to 50,000 persons having opportunities for employment in industry and in commerce, for professional and administrative work, and having essential services and amenities such as schools, shops, churches, places of entertainment and of refreshment, offices and institutions, parks and playing fields."

The New Towns Act was designed to relieve congested urban areas in respect of both density of population and of concentration of industry. The East Kilbride project was intended to pursue this objective in relation to Glasgow and contiguous overcrowded areas.

The area designated for the new town was 10,250 acres, centred on the existing village of East Kilbride and surrounded by a green belt embracing parts of the parish of East Kilbride, Carmunnock, Cambuslang, and Blantyre respectively.

Today the principal features of the new town are 4 "neighbourhoods" with populations varying between 10,000 and 12,000 people each provided with its necessary services; three industrial estates at the circumference; and a civic centre containing public buildings, offices, stores, car parking spaces, etc.

There are houses to suit families of varying size and with different income levels - small cottages, large cottages, flats, terraces, detached and demi-detached bungalows. Most of the houses are heated on the principle of either central or district heating.

Mention/

Mention has already been made of the growth of industrial estates in Lanarkshire. Many firms both from home and from America have established vast factories round the perimeter of East Kilbride. East Kilbride has now become a centre where engineering genius and technical skill have combined in the manufacture of component parts and finished products of the very highest class. The Department of Scientific and Industrial Research has established one of the largest laboratories in the country where the fruits of scientific enquiry are being placed at the disposal of industry. A small scale nuclear reactor is providing training and research facilities for students in Scottish Universities.

In 1947 when the new town took birth the population of the old village was just over 2,000 persons; the 1951 census recorded a population of 5,136 persons; in 1958 an estimate was 21,000; the 1961 census recorded a population of 31,970 persons; at the time of writing the estimated population is 38,000 persons.

Thus within the interval that a boy or girl might spend at school, the face of East Kilbride has been transformed from a tiny community supported by agriculture and rural crafts into an expensive modern town whose people are engaged in every variety of industry, business, trade and profession.

After 1960 the new community of East Kilbride began an agitation for burgh status and this was finally granted to them on 16th May, 1963. East Kilbride had come of age!

DISTRIBUTION OF POPULATION.

DISTRICT COUNCIL AREAS	1951 CENSUS	1961 CENSUS
1st	8,076	7,293
2nd	14,922	14,734
3rd	23,787	22,775
4th	34,365	33,795
5th	24,255	51,073
6th	60,225	64,045
7th	37,181	35,249
8th	38,301	36,958
9th	64,200	68,426
SMALL BURGHS		
Lanark	8,043	8,441
Biggar	1,437	1,399
NEW TOWN (Granted burgh status 1963)		
East Kilbride	5,136	31,970
LARGE BURGHS		
Airdrie	30,313	33,605
Coatbridge	47,541	53,825
Hamilton	40,174	41,928
Motherwell and Wishaw	68,154	72,794
Rutherglen	24,213	25,067

HOUSING.

"Tuberculosis is a social disease with medical aspects." Lanarkshire can give ample evidence of this truth. The trend of tuberculosis infection in a community is to a large extent a measure of the quality of the housing conditions of the people. Overcrowding whether it is persons per house or houses per acre is of paramount significance in the prevalence of tuberculosis and is inextricably associated with high infection rates and augmented morbidity and mortality. Adverse domestic circumstances not only determine infection but re-infection. Squalor and poverty often go hand in hand with overcrowded and insanitary houses.

The literature on tuberculosis has many references to the relation between bad housing and tuberculosis morbidity and mortality. In Scotland one thinks especially of the work of Macgregor, Westwater, McKinlay and Riddell.

Before World War II overcrowding was six times as bad in Scotland as it was in England. The slowing up of the decline in tuberculosis morbidity and mortality was related to the fact that in Scotland the building of houses was failing to keep pace with housing progress in England. Scotland was therefore at a disadvantage at the beginning of the War and it is not surprising that in the immediate post war years some Scottish Communities had in respect of tuberculosis prevalence some of the worst records in Western Europe.

The late Dr. Laidlaw (M.O.H. of Glasgow) noted that 4 times as many young adult males between the ages of 15 and 19 years living in single apartment houses succumbed to tuberculosis as compared with an equal number of males of the same age group living in 3 apartment houses. He also thought/

thought that the tuberculosis rate in contacts dwelling in one or two roomed houses was double that for those living in 3 or 4 roomed houses.

It is a recognised fact that more tuberculosis is found in old tenement blocks than in other types of dwelling. This was at one time attributed simply to the fact that concentration of people favoured frequent contact with the organism. But quantitative infection is not the only factor. Lack of adequate sanitation, of fresh air, sunlight and recreational space, dampness, and the sum total of all these on the human mind and spirit are also causative factors.

The housing problem in Lanarkshire began with the intensive industrial development that came to the County toward the end of the 18th century.

The 1911 census had shown that in Lanarkshire as a whole 16.5 per cent of the population lived in one apartment houses, 51.3 per cent in two apartment and 13.6 per cent in three apartment houses. The proportion varied widely from one community to another; residential Lanark had only 10.7 per cent of its people in one apartment houses whereas industrial Wishaw had 23 per cent. In 1911 20.2 per cent of the County's population was living more than 4 to a room. By 1951 this had dropped to 1.0 per cent.

PERCENTAGE OF POPULATION IN HOUSES OF DIFFERENT SIZES

Year	Number of Rooms				
	1	2	3	4	5
1911	17.5	51.3	14.7	5.5	3.6
1951	4.3	23.9	32.8	25.4	8.8
1961	3.1	14.1	37.1	32.9	8.7

Toward the end of 1958 the County Council decided that a survey of all the houses in the landward area of the County should be carried out for the purpose/

purpose of ascertaining the number of overcrowded, sub-let and insanitary dwellings to enable an accurate estimate to be made of the total housing requirements. This work was completed in mid 1959 and in the light of the information obtained a new 5 year housing programme was instituted. The total housing requirements for the landward area of the County were estimated at 10,703 houses made up of 1641 overcrowded families, 4,268 sub-tenants and 4,594 unfit houses. Of those 10,703 houses which for one reason or another are below adequate living standards the vast majority are in that area of the County covered by the Central Industrial Area Part Development Plan and include the three parishes of Cambuslang, Blantyre and Bothwell, traditionally the worst areas in respect of tuberculosis prevalence.

The 1959 survey showed a gross overcrowding figure of 8,131 in 87,979 fit dwellings or 9.4 per cent. The percentage of overcrowding extended from 0.65 in the new town of East Kilbride to 18.21 in Cambuslang. 60 per cent of all overcrowded houses are thus in a circumscribed industrial region representing 10 per cent of the total acreage of the landward area. Herein lies the kernel of the tuberculosis problem in the administrative area of the County Council.

A further word should be said of the Central Industrial Area Part Development Plan. Under the Town and Country Planning (Scotland) Act 1947, the County Council obtained permission from the Secretary of State to concentrate on a part development plan comprising the populous areas of the County between the Burghs of Airdrie and Coatbridge in the north, Hamilton, Motherwell and Wishaw in the south, and Glasgow and Rutherglen in the west. This area extends to 84 square miles, comprises one tenth of the total acreage/

acreage and contains approximately 50,000 houses with a population of 145,000 persons. The latter represents about 43 per cent of the entire population of the County Council's administrative area. Included within the plan is the designated area of the new town of East Kilbride. The plan has the effect of determining for the next 10 to 15 years the broad pattern of development within the central industrial belt and will deal not only with development control but with development to be undertaken by the County Council itself particularly in the housing sphere.

The County Council decided that, within the area covered by the approved plan, the Cambuslang district presented the most urgent need for redevelopment.

No review of the housing problem in Lanarkshire would be complete without a word on the pre-fab. The first pre-fab was completed and opened formally on 13th April, 1945 at Salsburgh. This was the first house to be completed in Scotland under the Government's temporary housing programme. The house was one of 70 erected on the same site. It was of the Phoenix type, a bungalow containing a living room, 2 bedrooms and a kitchen with bathroom. The framework was tubular steel covered with asbestos and corrugated asbestos was used for the roof.

There is no doubt that the pre-fab met a real and urgent need for post war housing and several thousand of these of varied design and construction were erected throughout the length and breadth of Lanarkshire. But far too many have had to remain habitable beyond their allotted span of life and have thus created another slum clearance problem.

REHOUSING OF TUBERCULOSIS FAMILIES.

In 1936 the County Council introduced a scheme to give families afflicted with tuberculosis a measure of priority on the housing list.

Families were classified according to 3 grades of priority:

Group I included cases of pulmonary tuberculosis with positive bacteriological findings.

Group II included cases of pulmonary tuberculosis with negative bacteriological findings, and cases of pleural effusion.

Group III included cases of non-pulmonary tuberculosis.

Classification was never decided rigidly on the above clinical criteria but each case for rehousing was considered on its own merits having regard to degree of overcrowding, number of cases of tuberculosis in family and sanitary condition of house.

The scheme has now been modified in the light of recent developments in the fight against tuberculosis. In 1960 it was decided to discontinue Groups II and III. Today each case is considered on its own merits, but by and large Group I is reserved for chronic infectious cases unresponsive to chemotherapy.

Since 1936 over 1,700 tuberculosis families have been rehoused under the priority scheme. Reference has already been made to the relation between bad housing and tuberculosis. Although rehousing of affected families has not the urgency as in the days before chemotherapy yet it is still of vital importance.

MASS RADIOGRAPHY.

Mass Radiography was introduced in Scotland in 1943 to improve methods of case finding and to discover by community surveys the symptomless cases of pulmonary tuberculosis.

It was in 1935 that the community application of mass radiography was first suggested by Manuel d'Abreu in Brazil and the credit must go to him for the development of the modern technique. Largely due to his initiative three machines were functioning in Brazil in 1937, and in 1938 no less than 20 sets were in different parts of America.

With the outbreak of war in 1939 British and American workers lost no time in arranging for large numbers of men and women entering the forces to undergo radiological examination on miniature film.

Community surveys were at first difficult to organise and the response was in most instances inadequate. Examination of selected groups was substitut The cause of the poor response to community surveys was on account of many factors but in particular inadequate publicity, limited operational planning, and insufficiency of technical equipment, but the most important factor was the fear of tuberculosis - fear of permanent disability, of prolonged unemployment, of economic hardship, of seperation from loved ones, of loss of personal esteem and social status, and fear of death from tuberculosis. The time was not opportune to exploit mass radiography and concentration on selected groups was at this stage inevitable. However, the method held great promise for the future and as events were to prove it soon gained general acceptance as a diagnostic measure. In fact the result of mass radiography surveys, confirmed by clinical and bacteriological investigation, provided the best index of the incidence of pulmonary tuberculosis for any community.

By/

By 1948-49 the morbidity and mortality rates for pulmonary tuberculosis in Scotland had become among the worst in Europe. But by 1956 the tide had turned against tuberculosis. Medical treatment had undergone a revolution. Waiting lists for beds in sanatoria had all but disappeared. Perhaps most significant of all the fear of tuberculosis had in some measure lifted. People had somehow become aware of its altered prognosis and were in a mood to co-operate.

The Department of Health for Scotland planned a coup de grace to tuberculosis and launched a two-year national campaign. The adverse Scottish record was greatly influenced by Glasgow, Renfrewshire and Lanarkshire. It was fitting therefore that the battle should be joined on Clydeside with Glasgow leading the field.

The Glasgow Campaign was organised on an unprecedented scale and the resounding success of that city is a glorious chapter in Public Health history.

By the autumn of 1957 the stage was set for the two year campaign in Lanarkshire. The account which follows tells of events from the first beginnings of mass radiography in the County to the year before the Campaign; an account is given of the Campaign itself, organisation, planning, results and appraisal; finally an attempt is made to formulate future lines of attack in eradicating tuberculosis.

It is perhaps not inappropriate to end this brief introduction with an extract from the Department of Health for Scotland Report 1958, "The two-year mass radiography campaign against tuberculosis was successfully completed. During the two years half the adult population of Scotland was X-rayed; in some of the urban areas where an intensive campaign was organised the population X-rayed was over 80 per cent. The ultimate results of this major effort/

effort cannot be evaluated for some time but the campaign may well become a classic example of what can be achieved in the health field by co-operation between the several health authorities, by concentration of resources and a full scale effort to enlist public interest."

TUBERCULOSIS AND THE MASS RADIOGRAPHY SERVICE IN LANARKSHIRE DURING THE PERIOD 1940-1963

The Two Year X-ray Campaign 1957-1958 is considered separately but for the sake of continuity of presentation the immediate post-Campaign years are included for discussion in this section of the paper.

The foregoing account of the tuberculosis problem in Lanarkshire and of the mass radiography service begins in the War Years 1940-1945. First, however, it is interesting to record that it was in Lanarkshire that some of the earliest administrative steps were taken to deal with tuberculosis as an infectious disease. In his book "Scottish Social Welfare" Professor Ferguson records, "In 1905 the Local Government Board requested all Medical Officers of Health in Scotland to furnish information as to the administrative arrangements for the control of phthisis in their districts. From their replies it was clear that little administrative machinery existed at that time. Only two local authorities had provided any hospital accommodation for cases of phthisis Lanark County where about 100 beds in infectious diseases hospitals had been available and Leith Burgh.

In 1906 the Local Government Board issued a circular to local authorities in which they pointed out that the provisions of the Public Health Act as to the removal of cases of infectious disease to hospital, and as to the provision of hospitals and houses of reception were as much available for dealing with cases of pulmonary phthisis as with cases of other infectious diseases. Local authorities were reminded that the provisions of the Act were comprehensive and elastic and could be adapted in practice to cases of phthisis of any degree of severity and the Board listed the types of institution which might be provided for cases of pulmonary phthisis - curative sanatoria for early cases, all day hospitals,/

hospitals, convalescent colonies and homes, work colonies, hospital wards for educative treatment and control, hospital wards for isolation of advanced cases and dispensaries.

In 1907 Lanarkshire was one of the first authorities to introduce a system of official notification and it was not until 1914 that compulsory notification of all forms of tuberculosis was introduced."

Turning now to the beginning of the period of study 1940-1963, the county Medical Officer, in his "Summary Annual Report for the Years 1940-1945," reported "It is gratifying to be able to record that during the trying period under review the health of the community in general was maintained. The statistics indeed in many directions show improvement, to instance only two: the infant mortality rate dropped from 84 in 1940 to 58 in 1945; and infectiou diseases showed a considerable decline. Particularly was this evident in diphtheria, the number of cases dropped from 956 in 1940 to 476 in 1945 and the number of deaths from 27 in 1940 to 9 in 1945."

After discussing the beneficial effects of the immunisation programme against diphtheria the County Medical Officer goes on to say "In contra-distinction to the above mentioned improvements the increasing incidence and mortality rates for tuberculosis are distressing. Established pulmonary cases increased from 893 on record at the beginning of 1940 to 1749 at the end of 1945; non-pulmonary cases rose from 973 to 1202 over the same period. The mortality rate for pulmonary tuberculosis in 1938 was 0.37 per 1000 of the population; in 1945 the rate was 0.64 per 1000. There is much speculation as to the cause of these increases. It should be realised that there is no one cause - many factors bearing on the spread of infection, and on the varying susceptibility of individuals are involved, each playing a varying part in different/

different cases. Young adults of both sexes are specially liable to develop dangerous tuberculosis and should have it borne in upon them that they can very easily overdo things - it is quite impossible for them to do a hard day's work and follow it with a hard night's dancing into the "wee sma' hours" several evenings a week without the risk of breakdown. Other factors such as bad housing conditions, shortage of adequate hospital facilities - due entirely, be it noted, to lack of nursing staff - are also important, and it is to be remembered medical practitioners and people generally are becoming more tuberculosis conscious and the increased use of diagnostic methods, particularly X-ray examinations and mass radiography surveys, are leading to more cases being diagnosed. It is noteworthy that the number of such examinations rose from 1385 in 1940 to 5999 in 1945."

In 1945 tuberculosis was the second principal cause of death, malignant disease taking first place, but in those under 40 years of age tuberculosis accounted for more deaths than any other single disease. The increasing gravity of tuberculosis in the War years was only a foretaste of the immense problem it was to become in the aftermath of the War.

On the subject of mass radiography the County Medical Officer stated in his quinquennial report for 1940-1945 "The County was particularly fortunate in being allocated one of the first three mass radiography units made available in Scotland. It commenced work in 1944 and at the start was temporarily housed in Cleland Hospital. Later when the ad hoc building was ready in the grounds of Motherwell County Hospital the machine was transferred there."

The premises at Cleland Hospital were quite unsuitable for large surveys and only small experimental surveys were undertaken for the calibration of the Unit, assembly of equipment and to enable the staff to gain experience in the very/

very minute and intricate operation of the machine.

The following surveys on miniature film were undertaken at Cleland Hospital:

Group	No. X-rayed
Cleland Hospital Staff	66
Sanatoria Staff	268
War-time Nursery Staff	54
County Council Employees	296
Total	684

When the Unit was transferred to permanent headquarters at Motherwell County Hospital, surveys of works groups in the County area within a radius of 5 miles were carried out, private bus transport being used where necessary.

The following were the results to the end of 1945:

Total number surveyed		3533
Referred for large film		292
Tuberculosis lesions:	requiring treatment	15
	observation	47

In his Report the County Medical Officer commented that on an average 500 persons were often examined in one week. Twelve years later the same X-ray Unit was regularly examining 500 persons in one session of two hours! Again from the same Report, "The operation of the Unit has been satisfactory both on the medical and technical sides. The method has proved itself an excellent one for case finding. The Unit has not been worked to anything approaching its full capacity. It is not considered desirable that this should be done at this stage because of the shortage of medical and nursing staff. If the mass radiography scheme does not in co-operation with the tuberculosis and rehabilitation/

rehabilitation schemes provide adequate facilities for the necessary treatment, observation, and rehabilitation of all cases disclosed it will lose most of its value as a measure for combatting pulmonary tuberculosis and rightly fall into disrepute. The use of the method can be speaded up and more intensive propaganda brought to bear when it is considered desirable. The Unit has already proved its worth."

Such was the beginning of the mass radiography service in Lanarkshire and no one in those days could have foreseen what a vital epidemiological and diagnostic weapon it was to become in the final struggle with tuberculosis.

Taking stock of the incidence of pulmonary tuberculosis in the County of Lanark throughout the War Years, disclosed tuberculosis cases were at the rate of 4.3 per 1,000 requiring treatment and 11.1 per 1,000 requiring observation.

From 1940 to 1945 the incidence of pulmonary tuberculosis rose by 52 per cent and the death rate by 26 per cent. Taking treatment and observation cases together the incidence of tuberculosis proved to be highest in females between 14 and 24 years; in males there were twin peaks of highest incidence, one between 14 years and 24 years, the other over 45 years. Broadly speaking this is the same pattern of age incidence 20 years later except that the female incidence is assuming more "maleness" and "peaks" are flattening out.

In Lanarkshire one factor which played a big part in producing the high post-War prevalence of tuberculosis was the war-time emergency hospital arrangements in which many infectious and potentially infectious patients had to be discharged to their own homes thus sowing the seeds of further infection.

During 1946 the mass radiography unit continued to operate at its headquarters surveying works groups, schoolchildren aged 15 years and over, teachers in the employment of the education authority, and patients and staff of/

of a small mental deficiency institution. The Unit was removed from its headquarters and set up at two sites, one in Hartwood Mental Hospital for a survey of patients and staff; and the second site was in a building in Cambuslang used for training industrial apprentices. At the latter site surveys of works groups within a 5 mile radius were carried out using where necessary private bus transport.

In his "Annual Report for 1946" the County Medical Officer reported, "Experience shows that the value of the method (miniature radiography) is widely appreciated by the public, though where time off work could not be allowed for the surveys the response was disappointing. This difficulty will not be overcome until the Unit is operating in an X-ray van with a generator which could then go to individual factories. It is impossible to site the Unit for surveys of less than 4,000 to 5,000 persons. Since there are no factories in the County area of sufficient size to ensure this number of examinees an X-ray van is the only satisfactory way of making the method easily available to works groups with minimum loss of working time." Thus even at this early date it was becoming apparent that the keynote of success in mass radiography is mobility of the X-ray Unit or, to put this another way, X-ray facilities must be taken to the doorstep of the working population.

From the first operation of the Unit in 1946 to the end of that year 11,625 persons were X-rayed. Significant tuberculosis cases disclosed were at the rate of 4.2 per 1,000 persons requiring treatment and 11.5 per 1,000 persons requiring observation. On these findings the County Medical Officer m this comment. "The 11,625 persons surveyed to the end of 1946 are a representative group of the working population in the age range 15 to 55 years. There are about 175,000 persons in this age range in the County of Lanark. The/

The results of our initial surveys therefore indicate that we would expect to find in the whole adult population of the County probably about 2,700 additional cases of significant pulmonary tuberculosis about 700 of them requiring treatment and 2,000 requiring observation of whom a considerable number will come to require treatment. Many will have meantime no symptoms or insufficient upset of health to lead them to seek medical advice and many will be infectious. There is little doubt that this number of cases of pulmonary tuberculosis is steadily being added to because of the large number of known and unknown infective cases in the community and the bad hygienic conditions in which many of the population live. Many known infective cases cannot have proper care, treatment, and isolation either at home because of lack of facilities or in sanatoria because of lack of nursing staff. The lack of rehabilitation facilities with special workshops means that a good many chronic cases with working capacity, many of whom are infective and carriers of the disease, are found to work in ordinary workshops to the danger of their workmates." Finally the County Medical Officer made this pertinent comment, "In view of the shortage of nursing staff, the unsatisfactory housing condition and other difficulties confronting the whole Tuberculosis Scheme and for which no possibility of amelioration can be seen for a considerable time it is not thought advisable to speed up the work of the Unit, use more intensive propaganda and extend surveys to the general public." Ten years after the County Medical Officer wrote these words, as a result of a revolution in treatment, adequacy of hospital beds and nursing staff, improved housing, and not least wholehearted team work, a mass radiography campaign was being carried out on an unprecedented scale in the County backed up by the most intensive propaganda.

A/

A statistical analysis of the 11,625 persons surveyed by the mass radiography service shows that the vast majority of new cases of disclosed pulmonary tuberculosis requiring treatment or close supervision were under 25 years of age and of these 80 per cent were females.

During 1947 the following groups were surveyed by the M.M.R. Unit:

1. Works Groups. Private bus transport was used where necessary to bring workers to the Unit. Helpful co-operation from managements was always satisfactory. Evening sessions with bus transport for workmen coming off shifts were arranged. But the year's experience again showed the necessity of having the Unit operating in an X-ray van before a satisfacto response can be expected from workers.

2. General Public. For the first time since the inception of a mass radiography service in Lanarkshire this type of examination was made available to the general public at Rutherglen and at Airdrie. Publicity was carried out in each of these two areas by press notices, slides in cinema and general posters, and in Airdrie by the distribution of leaflets to individual householders. The response was officially described as "moderate." 730 persons were examined at Rutherglen and 1,202 persons a Airdrie. This was the first occasion in Lanarkshire when advertising to the public was used in the service of mass radiography.

3. School children. The survey of school children was extended to those aged 12 years and over, the first survey having been confined to those above 15 years.

The practice of X-raying children under 15 years on the 35 m.m. film has now been discontinued in view of the genetic hazards of radiation.

4./

4. Symptom Group. By arrangement with the Burgh Medical Officers of Health and general practitioners in Rutherglen and Airdrie the examination was made available in the investigation of patients who had equivocal symptoms in whom the doctor wished to exclude pulmonary disease but in whom clinical examination did not justify a large film in the first instance.

The number of patients so referred was relatively small but the facilities were appreciated by the general practitioners, and the findings indicated that it was desirable to make the same facilities available to family doctors for routine survey of this group. The present day practice in Lanarkshire is to base the mobile Unit at strategic points throughout the County at 4 to 5 week intervals in the course of the year. An itinerary of the mobile Unit is sent in advance to every general practitioner. This scheme is discussed later in this paper.

The year 1948 is a land mark in the development of the mass radiography service and in the tuberculosis service throughout the country. On July 4th - the Appointed Day of the National Health Service Act - the control of mass radiography services and the clinical tuberculosis services passed from local health authorities to regional hospital boards. The question whether events in succeeding years have proved this to have been in the best interest of the two services is still a hotly debated one. While the experience of the presen writer has been gleaned for the most part from the Public Health side, the view is taken that the dichotomy of responsibility between the local health authority and the regional hospital board, created by the National Health Service Act, has not made for the best control of tuberculosis nor the best deployment of the mass radiography service. It might have been better had these services been left intact under the aegis of the medical officer of healt

The/

The X-ray campaigns of 1957 and 1958 proved how successful partnership between local health authorities and regional hospital boards could be; but for the less dramatic routine wrestling with tuberculosis problems the medical officer of health is in the best position to study the epidemiology of tuberculosis. He knows the "black spots" in his area, the groups of high incidence and high risk and those factors in the social and industrial milieu making tuberculosis an indigenous disease. He also is in the best position to decide how the static and mobile forces of mass radiography can best play their different roles. To see the whole problem of tuberculosis must be the work of a team of specialists but, better still, a team co-ordinated and controlled by someone - the M.O.H. - who has no speciality at all but a broad education.

To return to the post-War years, efforts were now directed to the radiographic examination of special groups with the attempt where circumstances permitted of encouraging members of the general public to come forward. Survey of special groups was directed to (a) high yield groups and (b) high risk groups. From 1948 onwards these groups were:

(1) Works groups

(2) Symptom group

(3) Ante-natal and post-natal women

(4) School teachers

(5) School children

(6) Day nursery and sanatoria staff

(7) Patients and staff in the large mental hospital and the two mental deficiency institutions in the County.

(8) School meals staff

(9) Diabetics

(10)/

(10) Technical college students

(11) Home helps

(12) Health visitors, district nurses and midwives

(13) General hospital staff

(14) Contacts

(15) Inmates and staff of Children's Homes.

In 1948 miniature radiography was made available to the general public in Coatbridge but on account of the Unit being sited in a large steel works some distance from the centre of the town the response was only 338 examinees. Again at an electrical firm in Hamilton, following requests from many of the workers, M.M.R. examination was offered to employees, their families and friend Special evening sessions were arranged. However only 82 persons availed themselves of the facilities. The site was not convenient for the general public in the area nor did the visit of the Unit receive any advance publicity.

In 1949 mass radiography was made available to the general public in the premises of an industrial firm at Larkhall. Advertising was done by posters exhibited in the windows of the principal shops and also by slides in the local cinemas. Special evening sessions were held to suit those who could not attend during normal working hours. The response was poor. Over a period of two months only 380 persons from the general public volunteered for X-ray.

In his "Report of the Mass Radiography Service for 1950" the Medical Director stated, "The mobile X-ray van with trailer generator was received from the Department of Health on 3rd February of this year. The Unit was out of action for some time while being fitted into the van and there was also some delay in appointing a driver technician.

With/

With the mobile Unit it will now be possible to provide an adequate miniature radiography service with the minimum loss of working time and interference with production for almost all the factory and workshop groups in the area."

On the subject of works groups, the Medical Director commented, "The survey of factory and workshop groups was continued during the year and one immediate result of the mobile X-ray Unit was an increase in the percentage of volunteers."

Events in succeeding years were to prove just how vital to the success of mass radiography is mobility of operation. Indeed it is becoming more and more evident today that people who are feeling in the best of health and who are singularly free from chest complaints are not prepared to go to much inconvenience just to have a chest film.

During 1951 the Unit operated entirely inside the mobile van, power being supplied from a trailer generator. As was anticipated this arrangement gave a much more satisfactory service especially in areas where factory and other groups were relatively small and scattered. The Medical Director commented in his Annual Report "The Unit functioned very smoothly and surveys without exception have been carried out conveniently and without discomfort to examinees in spite of some severe weather conditions. The Unit has continued to work in active co-operation with the Medical Officers of Health."

On the subject of public X-ray sessions the Medical Director commented "By arrangement with the Burgh Medical Officers of Health, sessions were held for the general public in the Town Hall at Coatbridge and Airdrie respectively where a total of 1,968 persons attended. Propaganda for these surveys arranged by the Medical Officers of Health was by notices in the local press and/

and cinemas and posters exhibited in shops and public buildings. In the total of 1,960 persons examined 6 treatment and 24 observation cases of tuberculosis were detected." This represents 3.1 per 1,000 active cases and 12.2 per 1,000 observation cases.

In 1952 the Unit operated at 88 sites and enabled a satisfactory service to be made available to even the smaller workshops. The Medical Director reported "Co-operation by employers has been very good and response of volunteers generally satisfactory. The impression is that the service is being increasingly appreciated and more in demand."

By arrangement with the Medical Officer of Health for Hamilton a survey was held in the Town Hall. 881 persons came forward for X-ray. 5 cases of pulmonary tuberculosis were disclosed as well as 23 other significant chest abnormalities.

In 1953 the Unit operated at 74 different sites and for the first time provided service away from "home". This was in the Burgh of Greenock and in the County of Ayr. This new venture for the Motherwell based M.M.R. Unit was a presage of ever widening commitments. In a short time the field of activity was to embrace the south west region of Scotland.

To return to 1953, by arrangement with the respective Medical Officers of Health surveys for the general public were held in the undernoted areas.

Motherwell and Wishaw	1,270 persons X-rayed
Kilmarnock and Irvine Valley	532 persons X-rayed

In Greenock a special survey was arranged by Greenock Corporation and the Department of Health for Scotland. The Lanarkshire Unit took part in this survey and X-rayed 9,585 persons over a period of 3 weeks. This represents a Unit performance of 640 persons X-rayed per day. This was a creditable/

creditable achievement for those early days and was an indication of what radiography staff and technical equipment could stand under pressure.

In 1954 surveys for the general public were held as undernoted, two within the County and one away from "home".

Cambuslang	591	persons X-rayed
Airdrie	5,649	" "
Beith	109	" "

The Airdrie survey was arranged in co-operation with the Town Council and the Department of Health for Scotland. Over a period of 3 weeks the Lanarkshire Unit X-rayed 5,649 persons - a Unit performance of 371 persons per day. The incidence of tuberculosis requiring treatment was 1.4 per 1,000 persons and observation 4.8 per 1,000 persons.

During 1955 the Lanarkshire Unit continued the examination of routine groups. As far as radiography of the general public is concerned, special surveys were held in the undernoted areas in co-operation with the Local Authorities concerned and the Department of Health for Scotland.

The table shows the number of persons X-rayed by the Lanarkshire Unit, the number of cases of pulmonary tuberculosis that came to light, and the rate per 1,000.

		New Cases Disclosed			
	No. X-rayed	Active	Rate/1,000	Observation	Rate/1,00
Rutherglen	2,456	4	1.6	23	9.4
Glasgow	2,783	6	2.2	63	22.6
Paisley	4,964	15	3.0	103	20.8
Dunbarton	5,429	15	2.8	75	13.8

Commenting on the work of the Unit the Medical Director reported "The numbers recalled for large film examination were 1,457 representing 3.28 per cent/

cent of those examined by miniature film. Throughout the year the Unit worked in Lanarkshire, Ayrshire, Dunbartonshire, Glasgow and Paisley. In all areas the work is planned in agreement with the Medical Officers of Health and during the year the Unit operated at 53 different sites. The Unit is essentially mobile; only small special groups (e.g. school teachers) are surveyed at base. Routine miniature radiography for contacts is carried out by the static 70 m.m. Unit at the Motherwell Chest Clinic."

The year 1956 completes this short account of the activities of the Lanarkshire M.M.R. Unit before it was committed to the strenuous campaigns of 1957-58.

During 1956 the Unit worked in Lanarkshire, Ayrshire, Dumfriesshire, Galloway, Stirlingshire and West Fifeshire. As in previous years work was carried out in agreement with Medical Officers of Health and the Unit operated at 77 different sites. The total number recalled for large films was 1,894 representing 3.97 per cent of the number examined on miniature film.

Special community surveys were arranged in co-operation with Local Authorities and the Department of Health for Scotland. The table below shows the numbers X-rayed by the Lanarkshire Unit and the incidence of tuberculosis cases disclosed.

		New Cases Disclosed			
	No. X-rayed	Active	Rate/1,000	Observation	Rate/1,000
Motherwell & Wishaw (excluding factories)	22,778	8	0.4	22	1.0
Stirlingshire	8,292	10	1.2	46	5.5
West Fifeshire (excluding factories)	2,822	6	2.1	17	6.0
Ayr	2,376	2	0.8	-	-
Dumfries	685	2	2.8	6	8.8
Castle Douglas	695	3	4.3	17	24.4
Newton Stewart	794	4	5.0	10	12.6
Stranraer	1,320	3	2.3	21	15.9

The Medical Director commented "The number of active cases disclosed in Newton Stewart and Castle Douglas was surprisingly high and indicates the importance of such surveys being held in rural communities." How right the Medical Director was in his view. This was confirmed in those campaigns conducted in rural areas in 1957-1958.

The Two Year Mass Radiography Campaign is considered separately in this paper and comment is now made on the work of the Unit in the years immediately succeeding the Campaign.

Commenting on the work of the Mass Radiography Unit during 1959 the Medical Director stated in his Report "In the course of the National Campaign which finished at the end of May 1959 with the Fife County survey the Lanarkshire Unit carried out 165,486 miniature film and 4,643 large film examinations. The number examined since the Unit commenced operating in 1944 has now passed the half million mark and stands at 539,626."

During the year 1960 56,921 persons attended the Unit for miniature film examination and of these 2.67 per cent were recalled for large film examination. This figure 56,921 brings the total number of persons examined since the Unit commenced operations during the War to 596,547.

Commenting in his Report the Medical Director stated "During 1960 the work of the Unit reverted to some extent to the pattern before the large community surveys. These surveys however were continued by the Lanarkshire Unit working alone in Ayrshire and in Dumfriesshire. The total examined in this group was 28,923 persons. In the factory and workshop groups some 16,679 were X-rayed as against 8,057 in the previous year. The rate of new significant cases in the active category detected has risen from 0.62 per 1,000 to 1.55 per 1,000. In the observation group the rate has fallen from 3.84 per 1,000 last year to 1.73 this year.

The findings in the Mental Health Group indicate the value of such surveys."

During 1961 40,315 persons attended for miniature film examination. 1,715 persons were recalled for large film examination, representing 4.25 per cent of the total examinees.

The Medical Director commented in his Report "For the first time since 1956 no general public surveys have been carried out. The largest group surveyed was in factory and workshops with sizeable numbers in Lanarkshire, Ayrshire and Dumfriesshire. The rise in new tuberculosis cases detected in Lanarkshire and Ayrshire indicates that the policy of continuing factory group surveys every two to three years is justified.

Mental Hospital surveys continue to show a significant incidence of new cases, and the routine groups which disclose no tuberculosis cases in the past two years disclosed 3 active and 6 observation cases this year in the 3,900 X-rayed.

A survey of H.M. Open Prison at Penninghame was done for the first time during the year, 1 observation case being detected. It has been arranged to visit here each six months."

At the completion of the year's work in 1961 the Lanarkshire M.M.R. Unit based at Motherwell was now 17 years old. It had carried out 636,862 miniature films and about 35,000 large films. It had given yeoman's service down the years and had won battle honours in almost every major campaign in 1957-1958. On an inside panel of the van are the plaques presented by Local Authorities which bear testimony to the trojan work of the Unit.

In the late fall of 1961 the original 35 m.m. camera Unit was replaced by a modern 70 m.m. Odelca Unit and the interior of the mobile van was rebuilt. Finally the old trailer generator was replaced by one modern in design, less than/

than half the size and much less noisy.

During 1962 48,496 examinees attended for 70 m.m. film examination. From those examined 1,162 were referred to the Chest Clinic. This represents a rate of 2.4 per cent. A further 109 patients were referred to their own doctors.

This was the first year of full operation of the new 70 m.m. Unit, and it made a very promising debut. The small generator was much more manoeuvrable and made siting much easier. The van-office was a great asset. It was therefore possible to visit many smaller firms than previously.

Factory groups accounted for some three quarters of the total examined. A high incidence of tuberculosis and carcinoma disclosed in this group indicates the need for continued surveys at two to three year intervals.

In 1962 surveys there was a rise over 1961 in both active and observation tuberculosis (active 1.43 to 1.6 per 1,000; observation 2.67 to 3.31 per 1,000). This rise was most marked in the female age group 25-34 from 1.09 to 3.21 per 1,000, and in the male age group 45-59 from 1.41 to 2.38 per 1,000.

In the Lanarkshire area in 1962 17.5 per cent of new cases of tuberculosis were detected by miniature radiography as against 14.5 per cent in 1961, and 10 per cent in 1955.

TABLE 1

RESPIRATORY TUBERCULOSIS LANARK COUNTY

YEAR	POPULATION	NEW CASES DISCLOSED		CONFIRMED CASES ON REGISTER	DEATH RATE PER 1000
		NUMBER	RATE/1000		
1940	303,370	333	1.09	968	0.5
1941	303,370	380	1.25	1,119	0.53
1942	303,370	450	1.47	1,269	0.58
1943	303,370	472	1.55	1,452	0.6
1944	303,370	507	1.66	1,641	0.63
1945	304,819	506	1.66	1,749	0.65
1946	305,232	605	1.98	1,991	0.67
1947	316,859	595	1.88	2,185	0.74
1948	318,126	599	1.87	2,335	0.79
1949	318,261	721	2.27	2,556	0.69
1950	318,942	633	1.99	2,727	0.5
1951	314,189	527	1.68	2,876	0.43
1952	311,443	501	1.61	3,048	0.28
1953	313,245	462	1.48	3,211	0.23
1954	315,470	559	1.77	3,330	0.23
1955	317,088	543	1.71	3,473	0.17
1956	319,785	555	1.74	3,574	0.2
1957	322,777	616	1.91	3,691	0.16
1958	325,421	496	1.52	3,652	0.16
1959	329,049	347	1.05	3,066	0.12
1960	334,091	344	1.02	3,062	0.06
1961	344,044	309	0.89	2,810	0.09
1962	347,448	299	0.86	2,732	0.09
1963	350,171	246	0.7	2,559	0.1

From a study of Table 1 the following points emerge:-

(1) The number of new cases of pulmonary tuberculosis reported annually rose sharply during the War years and reached a peak in 1949.

(2) The mortality rate from pulmonary tuberculosis also rose sharply during the War years and reached a peak in 1948.

(3) Until 1948 the gap between the case rate and the mortality rate was fairly constant but from then on the gap gradually widened. Between 1948 the year of highest mortality and 1956 the pre-campaign year the death rate fell by 74.7 per cent. The mortality rate has continued to fall in the post campaign years. This remarkable turn in the tide is attributable almost entirely to the efficacy of the new drugs.

These points are brought out graphically in Figure 1.

FIG 1

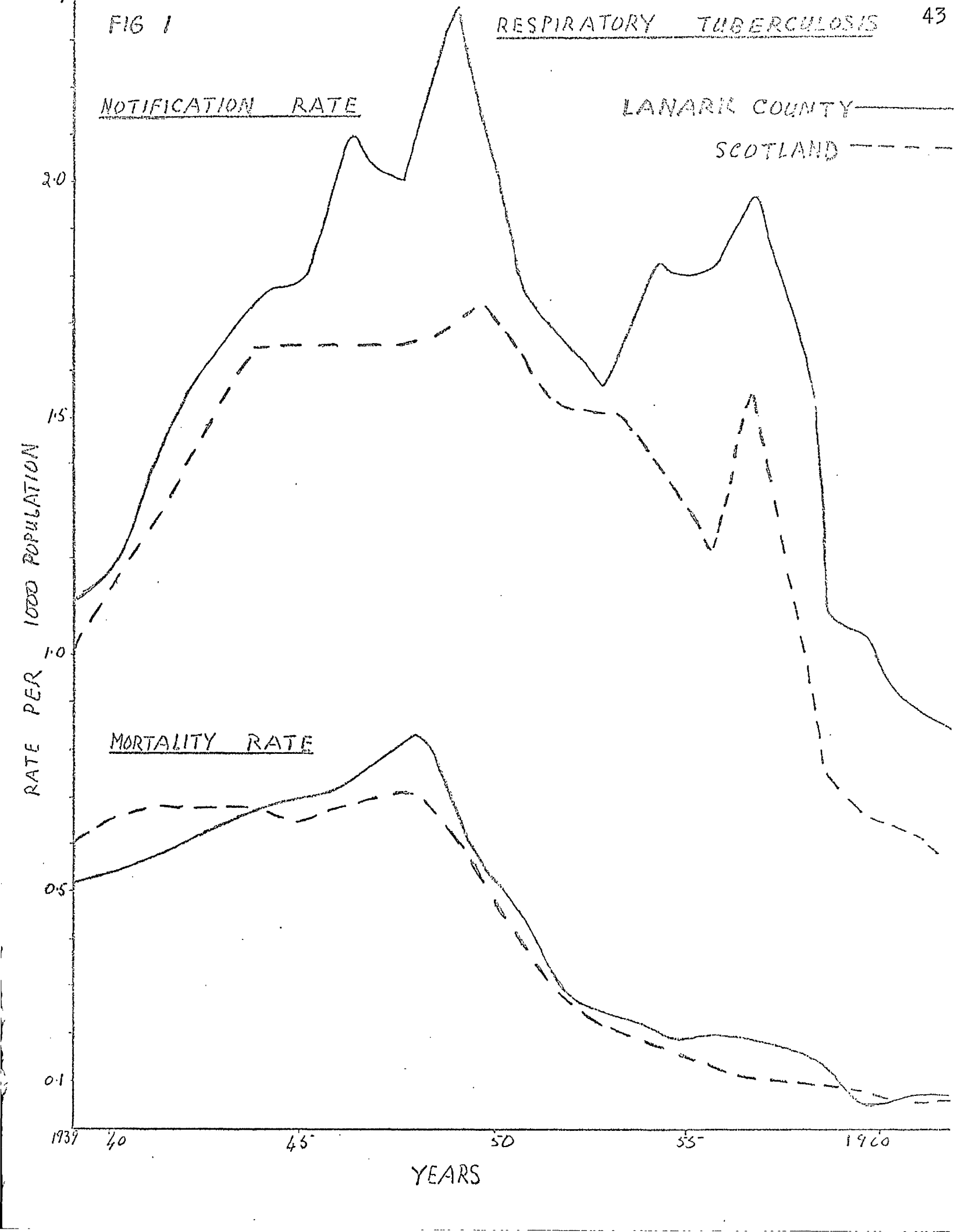
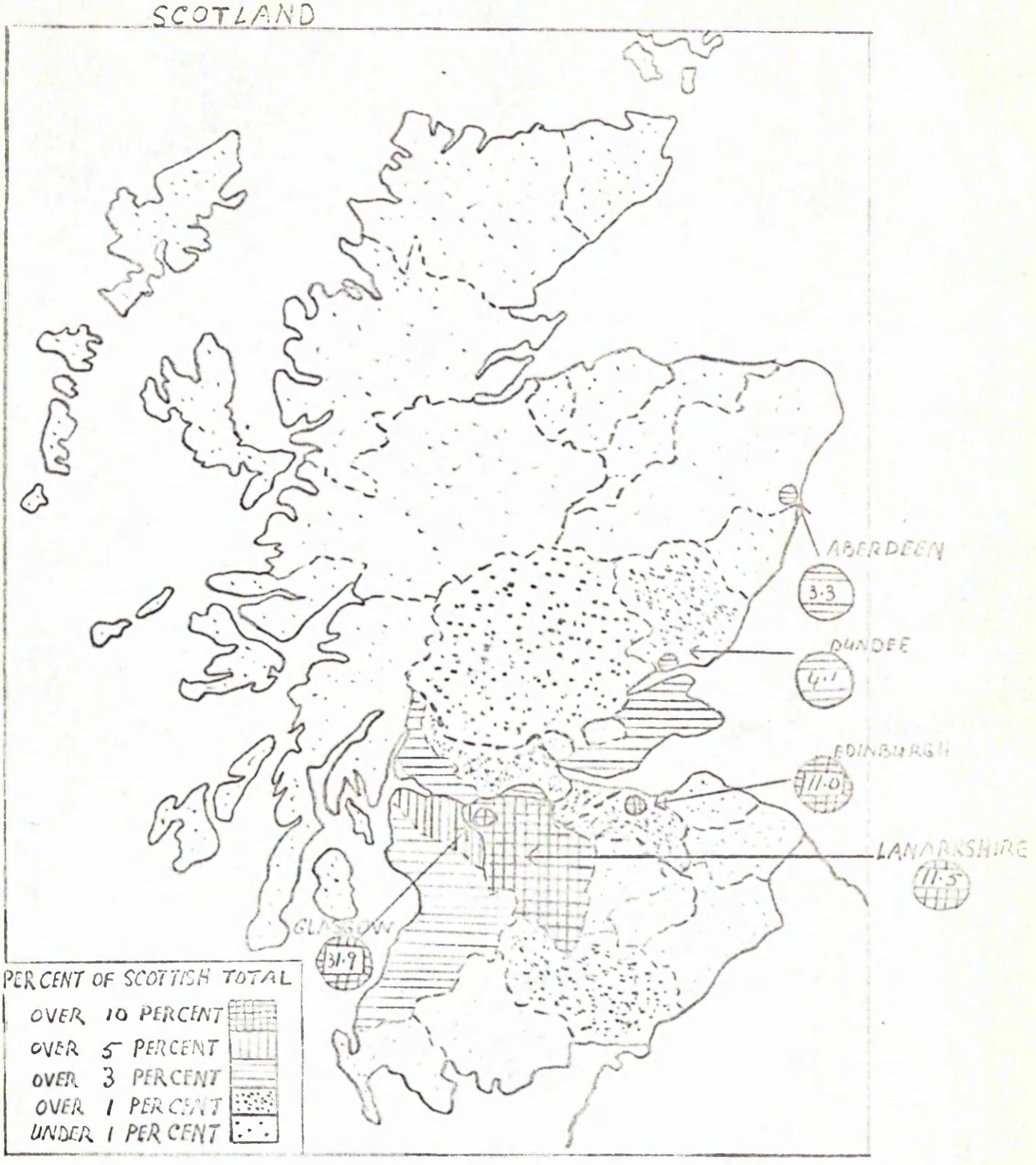

RESPIRATORY TUBERCULOSIS
NOTIFICATION RATE
LANARK COUNTY
SCOTLAND
MORTALITY RATE
RATE PER 1000 POPULATION
2·0
1·5
1·0
0·5
0·1
1939
40
45
50
55
1960
YEARS

TABLE II

RESPIRATORY TUBERCULOSIS

Comparative figures for Lanark County and Scotland in respect of Notification Rates and Mortality Rates per 1,000 Population.

Year	Notification Rate Per 1,000		Mortality Rate Per 1,000	
	Lanark County	Scotland	Lanark County	Scotland
1939	1.04	0.93	0.49	0.54
1940	1.09	1.08	0.50	0.62
1941	1.25	1.19	0.53	0.63
1942	1.47	1.31	0.58	0.62
1943	1.55	1.55	0.60	0.62
1944	1.66	1.56	0.63	0.62
1945	1.66	1.57	0.65	0.60
1946	1.98	1.56	0.67	0.64
1947	1.88	1.55	0.74	0.66
1948	1.87	1.59	0.79	0.66
1949	2.27	1.67	0.69	0.60
1950	1.99	1.57	0.50	0.47
1951	1.68	1.52	0.43	0.37
1952	1.61	1.44	0.28	0.28
1953	1.48	1.47	0.23	0.23
1954	1.77	1.38	0.23	0.20
1955	1.71	1.27	0.17	0.17
1956	1.74	1.15	0.20	0.14
1957	1.91	1.53	0.16	0.13
1958	1.52	1.00	0.16	0.12
1959	1.05	0.72	0.12	0.10
1960	1.02	0.64	0.06	0.09
1961	0.89	0.59	0.09	0.08
1962	0.86	0.54	0.09	0.08
1963	0.7	0.49	0.1	0.09



RESPIRATORY TUBERCULOSIS

CONFIRMED NOTIFICATIONS IN COUNTY AREAS (INCLUDING LARGE BURGHS) EXPRESSED AS A PERCENTAGE OF THE SCOTTISH TOTAL DURING 1952-56

From a study of Table II the following points emerge:

(1) The notification rates for Lanark County are consistently higher than those for all Scotland.

(2) From 1944 onwards the mortality rates for Lanark County are consistently higher than those for all Scotland until latterly the difference is insignificant.

(3) For both Lanark County and Scotland the highest morbidity and the highest mortality fell respectively in 1949 and 1948.

(4) 1956 was the year prior to stage 1 of the Lanark County X-ray campaign. Between 1949 and 1956 the notifications rate in the County fell by 23 per cent whereas that in Scotland fell by 31 per cent.

(5) Between 1948 the year of highest mortality and 1956 the death rate fell by 74.7 per cent in the County as compared with 78.8 per cent in Scotland.

Some of these points are also brought out in Figure I.

Mass Radiography Surveys of the Lanarkshire Mobile X-ray Unit (based at Motherwell)

Statement showing analysis by sex and age groups of the number of cases of tuberculosis detected and requiring treatment or supervision.

Year	Total Number X-rayed	Disclosed Cases of Tuberculosis	AGE GROUPS 14 - 19 M - F	20 - 24 M - F	25 - 34 M - F	35 - 44 M - F	45 - 54 M - F	55 + M - F	Totals M - F	Grand Total	Cases Previously Known	Age Group with Percentage Highest Incidence Male	Female
1946	11,625	Active	3 - 13	3 - 16	5 - 4	3 - 2	- -	1 - -	15 - 35	50	1	25-34(33 per cent)	14-24(83 per cent)
		Observation	16 - 39	7 - 25	13 - 17	9 - 6	6 - -	6 - -	57 - 87	144	10		
1947	23,515	Active	4 - 19	3 - 21	11 - 10	8 - 3	3 - -	2 - -	31 - 53	84	4	25-34(35 per cent)	14-24(75 per cent)
		Observation	28 - 61	9 - 31	17 - 33	17 - 12	10 - 3	9 - 1	90 - 141	231	22		
1948	37,348	Active	9 - 25	4 - 25	12 - 11	9 - 3	4 - -	2 - -	40 - 64	104	6	25-34(30 per cent)	14-24(78 per cent)
		Observation	48 - 101	16 - 49	32 - 48	23 - 12	16 - 6	13 - 2	148 - 218	366	45		
1949	52,588	Active	12 - 35	8 - 32	14 - 14	10 - 4	5 - -	2 - -	51 - 85	136	7	25-34(27 per cent)	14-24(79 per cent)
		Observation	72 - 138	22 - 61	38 - 62	27 - 14	19 - 7	16 - 3	194 - 285	479	61		
1950	64,466	Active	15 - 41	11 - 46	15 - 19	10 - 4	6 - 1	3 - -	60 - 111	171	7	14-19 25-34(25 per cent)	14-24(78 per cent)
		Observation	91 - 160	28 - 85	53 - 79	34 - 20	21 - 8	17 - 3	244 - 355	599	92		
1951	86,171	Active	22 - 59	12 - 52	21 - 27	12 - 4	10 - 2	3 - 1	80 - 145	225	7	14-19 25-34(26 per cent)	14-24(77 per cent)
		Observation	124 - 207	42 - 111	81 - 105	46 - 30	27 - 12	19 - 5	339 - 470	809	112		
1952	106,573	Active	25 - 74	14 - 57	23 - 30	14 - 4	11 - 2	4 - 2	91 - 169	260	7	14-19 25-34(26 per cent)	14-24(78 per cent)
		Observation	150 - 254	50 - 134	118 - 131	65 - 33	38 - 16	22 - 5	443 - 573	1,016	152		
1953	140,243	Active	36 - 90	21 - 67	34 - 38	22 - 6	14 - 5	8 - 2	135 - 208	343	13	14-19 25-34(26 per cent)	14-24(75 per cent)
		Observation	205 - 299	71 - 165	161 - 173	94 - 56	62 - 29	35 - 11	626 - 733	1,359	191		
1954	176,633	Active	43 - 105	24 - 76	46 - 49	27 - 8	19 - 5	9 - 3	168 - 246	414	15	14-19 25-34(27 per cent)	14-24(73 per cent)
		Observation	220 - 345	80 - 209	219 - 231	121 - 70	94 - 33	50 - 14	784 - 902	1,686	261		
1955	215,520	Active	59 - 120	27 - 85	56 - 56	31 - 9	22 - 5	13 - 3	208 - 278	486	17	14-19 25-34(28 per cent)	14-24(74 per cent)
		Observation	258 - 400	95 - 233	272 - 267	170 - 105	139 - 52	84 - 21	1018 - 1078	2,096	330		

Year	Total Number X-rayed	Disclosed Cases of Tuberculosis	AGE GROUPS 14 - 19 M - F	20 - 24 M - F	25 - 34 M - F	35 - 44 M - F	45 - 54 M - F	55 + M - F	Totals M - F	Grand Total	Cases Previously Known	Age Group with Percentage Highest Incidence Male	Female
1956	262,176	Active	59 - 135	29 - 94	68 - 64	32 - 11	28 - 8	18 - 3	234 - 315	549	18	14-19 25-34 (27 per cent)	14-24 (73 per cent)
		Observation	276 - 456	111 - 260	308 - 302	204 - 131	177 - 71	123 - 25	1199 - 1245	2,444	367		
			15 - 24				45 - 59	60 +					
1957	88,373	Active	25 - 40		25 - 17	14 - 13	37 - 8	18 - 5	123 - 86	209		45-59 (30 per cent)	15-24 (47 per cent)
		Observation	51 - 74		94 - 106	94 - 77	102 - 50	57 - 11	406 - 324	730	74		
1958	76,396	Active	5 - 6		3 - 9	9 - 3	10 - 7	4 - -	31 - 26	57	1	45-59 (32 per cent)	25-34 (35 per cent)
		Observation	17 - 26		35 - 48	42 - 28	65 - 32	52 - 15	213 - 151	364	129		
1959	88,469	Active	8 - 6		11 - 5	10 - 4	11 - 4	5 - -	46 - 19	65		25-34 45-59 (24 per cent)	15-24 (32 per cent)
		Observation	15 - 18		27 - 17	38 - 20	57 - 22	39 - 10	177 - 87	264	112		
1960	55,174	Active	7 - 10		6 - 7	1 - 5	8 - -	4 - -	27 - 22	49		45-59 (30 per cent)	15-24 (45 per cent)
		Observation	5 - 3		10 - 10	7 - 10	19 - 9	8 - 2	50 - 36	86	67		
1961	40,315	Active	7 - 7		14 - 2	10 - 2	10 - 1	3 - 1	44 - 14	58	1	25-34 (32 per cent)	15-24 (50 per cent)
		Observation	9 - 3		14 - -	20 - 3	22 - 5	14 - -	88 - 20	108	111		
1962	48,496	Active	7 - 19		8 - 11	11 - 1	15 - 3	2 - -	43 - 35	78		45-59 (35 per cent)	15-24 (54 per cent)
		Observation	13 - 14		28 - 10	26 - 11	37 - 9	8 - 3	113 - 48	161	69		
1963	45,450	Active	4 - 5		12 6	6 -	6 3	3 -	31 16	47		25-34 (39 per cent)	25-34 (38 per cent)
		Observation	4 - 6		4 6	9 7	17 2	10 6	44 28	72	138		

Table III shows the annual number of persons X-rayed by the Lanarkshire M.M.R. Unit based at Motherwell from the beginning of the service in 1944 until the present day. The table also shows the number of cases of respiratory tuberculosis in respect of sex and age groups.

From 1944 to 1952 the Unit operated only within the geographical area of the County but from 1953 the field of operations extended to the area of south west Scotland.

It will be observed that from 1946 to 1956 the highest incidence of respiratory tuberculosis in males occurs most frequently in the age group 25 to 34 years but after 1956 there is a second peak in the older age groups.

In females the highest incidence is almost entirely confined to one particular age group, 14 to 24 years, accounting for approximately two thirds of all cases.

There is also some evidence for the trend observed by many workers that tuberculosis is becoming a disease of 'old men and young women'.

TABLE IV.

RESPIRATORY TUBERCULOSIS.

Table IV shows rate per 1,000 persons of respiratory tuberculosis in the various groups surveyed by the Lanarkshire Mobile Mass Radiography Unit.

GROUP	YEAR	ACTIVE P.T.	OBSERVATION P.T.	NO. X-RAYED
ALL GROUPS	1944-1952	2.42	7.7	103,503
	1953	2.34	9.16	32,854
	1954	1.91	7.10	36,209
	1955	1.63	7.73	42,954
	1956	1.33	6.65	46,787
	1957	2.36	7.42	88,373
	1958	0.76	4.88	74,620
	1959	0.73	2.98	88,469
	1960	0.88	1.55	55,174
	1961	1.33	2.14	37,352
	1962	1.57	3.08	46,986
	1963	1.03	1.58	45,450
		1.54	5.25	698,731

TABLE IV

GROUP	YEAR	ACTIVE	OBSERVATION	NO. X-RAYED
FACTORIES	1953	2.31	6.25	12,966
	1954	2.16	8.41	17,595
	1955	1.88	7.97	19,199
	1956	1.16	7.1	19,021
	1957	2.15	4.47	16,764
	1958	1.2	4.45	5,846
	1959	0.62	3.84	8,057
	1960	1.55	1.73	16,679
	1961	1.47	1.67	29,890
	1962	1.75	3.27	36,979
	1963	1.04	1.33	23,881
		1.61	4.25	206,877
ROUTINE	1953	2.45	7.34	2,860
	1954	2.11	3.37	2,373
	1955	-	1.32	3,027
	1956	0.79	3.57	2,523
	1957	0.6	3.0	1,666
	1958	1.7	1.7	1,761
	1959	-	0.68	1,464
	1960	-	0.70	4,240
	1961	0.76	1.52	3,944
	1962	0.46	1.17	4,268
	1963	0.55	1.11	5,374
		0.77	2.11	33,500

TABLE IV

GROUP	YEAR	ACTIVE	OBSERVATION	NO. X-RAYED
GENERAL PUBLIC	1953	3.4	17.0	9,414
	1954	2.52	9.52	8,721
	1955	2.97	16.38	7,752
	1956	1.92	7.03	19,772
	1957	2.49	8.51	65,772
	1958	0.71	5.19	64,509
	1959	0.75	2.99	77,115
	1960	0.58	1.17	28,923
	1961	-	-	176
	1962	1.97	6.9	1,014
	1963	0.63	1.26	6,333
		1.4	5.81	289,501
SCHOOL-CHILDREN	1953	1.05	5.12	7,614
	1954	0.53	2.39	7,520
	1955	0.69	3.73	11,520
	1956	-	5.12	5,469
	1957	1.21	2.82	2,484
	1958	0.45	-	2,244
	1959	-	-	942
	1960	2.83	8.49	353
	1961	2.05	36.96	487
	1962	1.09	2.18	917
	1963	1.28	1.28	1,554
		0.7	3.89	41,104

TABLE IV.

GROUP	YEAR	ACTIVE	OBSERVATION	NO. X-RAYED
TECHNICAL COLLEGE STUDENTS	1955	2.06	4.12	1,456
	1957	2.96	5.34	1,687
	1959	2.24	1.12	891
	1960	0.89	1.34	2,223
	1961	0.58	1.16	1,170
	1962	-	1.07	1,855
	1963	0.94	0.94	3,169
		1.28	2.08	12,451
MENTAL HOSPITAL PATIENTS	1953	3.42	18.26	876
	1954	11.05	11.05	181
	1955	5.67	32.62	1,410
	1956	0.95	14.26	1,052
	1957	-	11.11	90
	1958	3.38	11.26	1,776
	1959	-	9.58	313
	1960	5.72	9.15	1,747
	1961	2.69	9.44	2,963
	1962	2.64	10.59	1,510
	1963	2.70	5.40	2,958
		3.36	12.03	14,876

Table IV complements Table III and shows the findings in the various population groups surveyed by the Lanarkshire Mobile M.M.R. Unit since it began operations in 1944.

Routine groups include Local Authority staff, that is, health visitors, district nurses, midwives, nursery nurses and attendants, home helps, and school teachers. The numbers X-rayed in this group are not great because a considerable number of the examinees are called to static Units at the annual X-ray check up. In Lanarkshire there are three static Odelca film units at Motherwell, Coatbridge and Rutherglen.

In the General Public group the large number X-rayed in the years 1957, 1958 and 1959 reflect the work done by the Motherwell M.M.R. Unit in mass community X-ray campaigns.

The figures for all groups show a downward trend from the War and post War years both in respect of active tuberculosis and tuberculosis requiring observation. The exception is the year 1957 but the relatively high figures in this instance are what one might expect during the intensive X-ray campaign in the Glasgow region.

The findings in the Factories group show considerable variation from year to year and it must be accepted that this will continue to be a high yield group for some years.

The figures given for School-Children group are in respect of positive reactors between 13 and 17 years when these children were tested prior to B.C.G. vaccination. The whole question of screening school-children for tuberculosis is discussed later in this paper.

The findings for mental hospital patients emphasise the importance of this group for regular survey.

Year	Group X-rayed	Number X-rayed	Tuberculosis Rate/1000	AGE GROUPS - 15 M	- 15 F	15 - 24 M	15 - 24 F	25 - 34 M	25 - 34 F	35 - 44 M	35 - 44 F	45 - 59 M	45 - 59 F	60 + M	60 + F	Totals M	Totals F	Grand Total
1958	ALL GROUPS	76,396	Active	-	0.4	0.7	0.6	0.4	1.2	1.4	0.4	1.3	0.8	1.0	-	0.9	0.6	0.8
			Observation	0.9	0.8	2.5	2.5	5.1	6.3	6.5	3.8	8.5	3.4	13.5	2.7	6.3	3.6	4.8
1959	"	88,469	Active	1.3	-	0.8	0.5	1.2	0.6	1.1	0.5	1.1	0.4	1.0	-	1.1	0.4	0.7
			Observation	1.3	-	1.5	1.6	3.0	2.1	4.5	2.4	5.5	2.0	8.2	1.7	4.1	1.9	3.0
1960	"	55,174	Active	0.4	-	1.0	0.9	0.9	1.3	1.2	0.9	1.4	-	1.9	-	1.0	0.8	0.9
			Observation	4.2	1.7	0.7	0.3	1.6	1.8	1.2	1.9	3.2	1.6	3.9	1.1	1.9	1.3	1.6
1961	"	40,315	Active	-	0.4	1.0	1.4	2.2	1.1	1.5	1.2	1.4	0.5	1.7	1.0	1.5	1.2	1.4
			Observation	3.5	3.9	1.3	0.6	2.2	-	3.1	1.8	3.1	2.5	7.8	-	3.1	1.7	2.7
1962	"	48,496	Active	-	0.2	1.1	2.0	1.2	3.2	1.6	0.3	2.4	1.0	1.3	-	1.5	1.7	1.6
			Observation	1.8	2.3	2.0	1.4	4.1	2.9	3.9	3.8	5.9	3.1	5.2	4.3	4.0	2.4	3.3
1963	"	45,450	Active	-	0.3	0.6	0.7	2.3	2.0	1.0	-	0.9	0.8	1.7	-	1.3	1.3	1.0
			Observation	-	1.7	0.6	0.8	0.8	2.0	1.6	2.4	2.7	0.5	5.8	4.4	1.8	2.1	1.6

TABLE V

Year	Group X-rayed	Number X-rayed	Tuberculosis Rate/1000	AGE GROUPS - 15 M	- 15 F	15 - 24 M	15 - 24 F	25 - 34 M	25 - 34 F	35 - 44 M	35 - 44 F	45 - 59 M	45 - 59 F	60 + M	60 + F	Totals M	Totals F	Grand Total
1960	MENTAL HOSP. STAFF	389	Active	-	-	-	-	-	-	-	18.8	-	-	-	-	-	-	2.56
			Observation	-	-	-	-	-	-	-	18.8	-	-	-	-	-	-	-
1961	"	1,009	Active	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Observation	-	-	-	-	-	-	7.9	-	-	-	-	-	2.1	-	1.0
1962	"	676	Active	-	-	-	-	-	19.6	-	10.0	-	-	-	-	-	5.6	3.0
			Observation	-	-	-	-	-	-	-	-	7.4	-	-	-	3.1	-	1.5
1959	STUDENTS	891	Active	-	-	2.5	-	-	-	-	-	-	-	-	-	2.3	-	2.2
			Observation	-	-	1.2	-	-	-	-	-	-	-	-	-	1.1	-	1.1
1960	"	2,223	Active	-	-	1.2	-	-	-	-	-	-	-	-	-	-	-	0.89
			Observation	-	-	1.8	-	-	-	-	-	-	-	-	-	-	-	1.34
1961	"	1,710	Active	-	-	0.7	-	-	-	-	-	-	-	-	-	0.6	-	0.6
			Observation	-	-	1.3	-	-	-	-	-	-	-	-	-	1.2	-	1.2
1962	"	1,855	Active	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Observation	-	-	0.7	-	6.4	-	-	-	-	-	-	-	1.3	-	1.1
1963	"	2,973	Active	-	-	1.2	-	-	-	-	-	-	-	-	-	1.1	-	1.0
			Observation	-	-	0.8	5.3	-	-	-	-	-	-	-	-	0.7	5.1	1.0

Year	Group X-rayed	Number X-rayed	Tuberculosis Rate/1000	AGE GROUPS - 15 M	- 15 F	15 - 24 M	15 - 24 F	25 - 34 M	25 - 34 F	35 - 44 M	35 - 44 F	45 - 59 M	45 - 59 F	60 + M	60 + F	Totals M	Totals F	Grand Total
1958	GENERAL PUBLIC	64,509	Active	-	-	0.5	0.5	0.5	0.8	1.5	0.5	1.3	0.8	1.1	-	0.9	0.5	0.7
			Observation	1.6	1.6	2.3	2.6	5.8	6.2	7.4	4.1	8.8	3.8	14.2	2.7	6.9	3.8	5.2
1959	"	77,115	Active	2.1	-	0.6	0.7	1.2	0.7	1.1	0.5	1.2	0.4	1.1	-	1.1	0.5	0.8
			Observation	2.1	-	1.5	1.8	2.4	1.9	5.0	2.4	5.2	2.1	8.1	1.8	4.1	2.0	3.0
1960	"	242	Active	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Observation	-	-	-	-	-	-	47.6	-	-	-	-	-	-	-	4.1

Year	Group X-rayed	Number X-rayed	Tuberculosis Rate/1000	AGE GROUPS - 15 M	- 15 F	15 - 24 M	15 - 24 F	25 - 34 M	25 - 34 F	35 - 44 M	35 - 44 F	45 - 59 M	45 - 59 F	60 + M	60 + F	Totals M	Totals F	Grand Total
1958	FACTORIES GROUP	5,846	Active	-	-	3.5	1.0	-	4.6	-	-	-	-	-	-	0.7	1.6	1.2
			Observation	-	-	5.2	2.5	2.4	9.3	2.8	3.0	10.2	-	9.8	6.7	4.8	4.1	4.5
1959	"	8,057	Active	-	-	1.1	-	1.4	-	1.8	-	-	-	-	-	1.1	-	0.6
			Observation	-	-	2.2	1.4	6.4	5.0	1.8	3.9	10.1	-	5.8	-	5.1	2.2	3.8
1960	"	12,707	Active	-	-	3.5	2.3	0.9	0.9	-	1.3	3.8	-	9.3	-	-	-	1.9
			Observation	-	-	0.9	0.3	1.9	2.6	1.7	4.0	4.5	4.8	4.7	-	-	-	1.9
1961	"	17,383	Active	-	-	1.5	1.5	2.4	2.7	1.8	4.0	2.2	-	2.7	-	2.0	2.0	2.0
			Observation	-	-	1.5	1.0	2.2	-	3.6	2.0	4.4	-	5.5	-	3.0	0.8	2.6
1962	"	26,132	Active	-	-	2.0	2.5	1.4	3.5	2.5	-	2.3	1.0	1.7	-	2.0	2.2	2.1
			Observation	-	-	3.7	1.6	4.8	4.0	4.6	5.8	6.5	5.2	8.6	29.9	5.0	3.1	4.2
1963	"	12,450	Active	-	-	0.6	1.4	4.2	2.6	1.1	-	0.6	-	3.0	-	1.7	1.2	1.5
			Observation	-	-	0.6	1.8	-	1.3	2.7	2.6	2.4	-	8.9	-	1.7	1.7	1.7

Year	Group X-rayed	Number X-rayed	Tuberculosis Rate/1000	AGE GROUPS - 15 M	- 15 F	15 - 24 M	15 - 24 F	25 - 34 M	25 - 34 F	35 - 44 M	35 - 44 F	45 - 59 M	45 - 59 F	60 + M	60 + F	Totals M	Totals F	Grand Total
1958	MENTAL HOSP. PATIENTS	1,776	Active	-	-	-	17.5	5.7	-	8.7	-	3.6	-	6.8	-	5.3	1.2	3.4
			Observation	46.5	-	-	-	17.2	-	4.4	-	18.1	4.3	33.8	10.1	16.8	4.9	11.3
1959	"	315	Active	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Observation	-	-	14.1	-	21.5	-	-	-	-	-	-	-	11.6	-	9.6
1960	"	1,747	Active	-	-	-	9.8	8.9	-	17.9	17.5	9.6	-	-	-	-	-	5.7
			Observation	-	-	6.6	-	8.9	-	11.9	-	16.0	14.0	14.0	3.5	-	-	9.1
1961	"	1,559	Active	-	-	8.5	30.3	13.3	-	7.1	-	-	5.3	4.9	3.3	4.8	5.5	5.1
			Observation	-	-	25.4	15.2	13.3	-	21.4	-	10.3	5.3	14.6	-	15.7	2.7	9.7
1962	"	845	Active	-	-	-	-	-	-	10.0	-	6.7	-	15.4	-	5.7	-	3.6
			Observation	-	-	-	-	30.8	-	40.0	-	40.3	38.5	15.4	-	24.5	9.5	18.9
1963	"	1,947	Active	-	-	-	15.6	11.6	-	11.1	-	2.6	4.5	7.2	-	5.6	2.3	4.1
			Observation	-	-	-	-	-	13.3	5.6	-	15.5	-	10.8	8.2	9.3	4.6	7.2

Year	Group X-rayed	Number X-rayed	Tuberculosis Rate /1000	AGE GROUPS - 15 M	- 15 F	15 - 24 M	15 - 24 F	25 - 34 M	25 - 34 F	35 - 44 M	35 - 44 F	45 - 59 M	45 - 59 F	60 + M	60 + F	Totals M	Totals F	Grand Total
1958	ROUTINE (Teachers: Local Authority Staff etc)	1,761	Active	-	-	-	-	-	4.7	7.2	-	7.5	-	-	-	4.1	0.8	1.7
			Observation	-	-	-	2.6	-	4.7	-	-	7.5	-	-	-	2.1	1.6	1.7
1959	"	1,464	Active	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Observation	-	-	-	-	-	-	-	-	-	-	43.5	-	1.8	-	0.7
1960	"	4,240	Active	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Observation	-	-	-	1.4	-	-	3.0	-	-	0.9	-	-	-	-	0.7
1961	"	3,944	Active	-	-	-	1.7	2.8	-	2.5	-	-	-	-	-	0.1	0.4	0.8
			Observation	-	-	-	-	8.2	-	-	-	3.8	-	12.8	-	4.0	-	1.5
1962	"	4,268	Active	-	-	-	-	-	2.0	-	-	1.8	-	-	-	0.7	0.4	0.5
			Observation	-	-	-	-	-	2.0	-	2.0	3.7	1.0	-	-	1.4	1.1	1.2
1960	COMMON LODGING HOUSE	224	Active	-	-	-	-	76.9	-	-	-	-	-	7.8	-	-	-	8.9
			Observation	-	-	-	-	-	-	-	-	15.9	-	15.5	-	-	-	13.3
1961	"	78	Active	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Observation	-	-	-	-	-	-	-	-	25.6	-	-	-	-	-	25.6

Table V shows the findings in respect of respiratory tuberculosis of the Lanarkshire Mass Radiography Unit. In each group a specific breakdown of figures according to age and sex is only available from 1958.

No attempt is made to put too fine an interpretation upon the results of these M.M.R. surveys, nevertheless a general pattern of tuberculosis morbidity runs fairly consistently through all the groups. In males the highest incidence of significant tuberculosis occurs over the age of 45; in females the highest incidence occurs between 25 and 34 years. In the Mental Hospital group and Common Lodging House group although the number of examinees is too small to give valid conclusions there is a reasonable inference that these two groups are high yield for tuberculosis.

The over all incidence of significant tuberculosis is higher in males.

Statistics of the Work of the Lanarkshire Mass Radiography Unit.

Community Chest X-ray Surveys — Lanarkshire large Burghs 1954-1956

Areas surveyed, X-ray provision, response and tuberculosis yield

Area Surveyed	Year	Period (Weeks)	No.of X-ray Units	No.of Unit Weeks	Adult Population 1951 Census	Adults X-rayed		Yield of New Cases of Tuberculosis			
						Number	Per Cent Adult Pop.	Active		Observation	
								Number	Rate Per 1000	Number	Rate Per 1000
Coatbridge and Airdrie Burghs	1954	5	2	10	55,000	12,522	22.8	21	1.7	54	4.3
Rutherglen Burgh	1954	1 4	1 1	5	19,000	2,648	13.9	4	1.4	10	3.6
Motherwell and Wishaw Burgh	1955	3	3	9	52,000	20,548	39.5	51	2.4	110	5.2
Hamilton Burgh	1956	3	3	9	30,000	14,380	47.9	19	1.3	95	6.5

Prior to 1957, the first year of the Lanark County Mass Radiography Campaign, no community chest X-ray survey was carried out on a major scale in the landward area of the County or in any area of the County administered by the County Council. Table VI shows the community surveys carried out in the areas of the large Burghs and in each of these surveys the Lanarkshire Mass Radiography Unit played an active role.

LANARK COUNTY

RESPIRATORY TUBERCULOSIS

ANNUAL NOTIFICATIONS BY AGE AND SEX

	AGE GROUPS																		
	- 5		5 - 15		16 - 24		25 - 34		35 - 44		45 - 54		55 - 64		65 +		Totals		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M + F
POP.	15807	14909	27242	26444	22319	24908	22154	23969	21744	22462	18685	19672	12565	14808	12232	14236	152766	161435	314201
1954	12	13	32	33	64	97	42	61	26	27	28	9	13	6	9	3	226	249	475
1955	12	12	35	33	52	92	27	49	32	24	28	11	23	6	12	2	221	229	450
1956	10	9	32	26	57	86	36	42	35	21	27	11	27	2	25	5	249	202	451
1957	12	7	19	27	55	90	42	60	45	39	47	7	38	5	23	11	281	245	526
1958	9	8	26	23	41	56	26	46	32	25	36	13	20	10	22	4	212	185	397
1959	6	8	7	14	40	36	23	25	14	23	23	16	28	2	10	4	151	128	279
1960	4	5	14	7	22	45	29	25	15	19	25	8	21	2	15	1	145	112	257
1961	3	4	15	1	31	40	15	19	18	16	18	8	22	4	13	3	135	95	230
1962	10	1	6	18	18	40	23	25	13	15	17	5	14	-	17	4	118	108	226
1963	6	6	6	11	24	20	8	18	22	12	22	10	15	2	9	2	112	81	193

LANARK COUNTY

RESPIRATORY TUBERCULOSIS

RATE PER 1000 RELATIVE TO TOTAL NUMBER OF MALES AND FEMALES IN EACH AGE GROUP

	AGE GROUPS																		
	- 5		5 - 15		16 - 24		25 - 34		35 - 44		45 - 54		55 - 64		65 +		Totals		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M + F
POP.	15807	14909	27242	26444	22319	24908	22154	23969	21744	22462	18685	19672	12565	14808	12232	14236	152766	161435	314201
1954	.76	.87	1.17	1.25	2.87	3.89	1.9	2.54	1.2	1.2	1.5	.46	1.02	.4	.73	.2	1.48	1.55	1.51
1955	.76	.8	1.28	1.25	2.33	3.69	1.22	2.04	1.47	1.07	1.5	.56	1.83	.4	.98	.14	1.44	1.42	1.43
1956	.76	.69	1.17	.98	2.55	3.45	1.62	1.75	1.61	.93	1.44	.56	2.14	.13	2.04	.35	1.64	1.25	1.44
1957	.76	.53	.69	1.02	2.55	3.61	1.9	2.5	2.07	1.7	2.51	.35	3.02	.34	1.88	.77	1.84	1.52	1.67
1958	.57	.63	.99	.87	1.84	2.25	1.17	1.92	1.47	1.11	1.93	.66	1.59	.67	1.79	.28	1.39	1.15	1.26
1959	.38	.63	.26	.53	1.79	1.44	1.03	1.08	.64	1.02	1.23	.81	2.22	.13	.81	.28	.99	.79	0.89
1960	.25	.34	.51	.26	.98	1.81	1.31	1.08	.69	.85	1.34	.41	1.67	.13	1.22	.07	.95	.69	0.82
1961	.19	.27	.55	.04	1.39	1.61	.68	.79	.83	.71	.96	.41	1.8	.27	1.06	.21	.88	.59	0.73
1962	.63	.06	.22	.68	.86	1.61	1.04	1.04	.59	.66	.91	.25	1.11	-	1.39	.28	.77	.66	0.72
*1963	.34	.36	.19	.36	1.0	.82	.36	.75	.95	.5	1.04	.46	.95	.11	.73	.12	.67	.46	0.56

* The figures for 1963 have been adjusted to the 1961 Census of Population.

Table VII shows the number of annual notifications according to age group and sex for respiratory tuberculosis in the County of Lanark for the period immediately preceding the Mass X-ray Campaign in 1957-1958 until the years immediately succeeding the Campaign.

Table VIII is complementary to table VII and embodies the same findings but expressed as rate per 1,000 relative to the number of males and females in each age group.

The following points seem worthy of comment:

(1) Although the incidence of respiratory tuberculosis has been falling since 1954 the rate of fall has been accelerated in the years immediately succeeding the Mass X-ray Campaign. The comparatively high rate for 1957 is a reflexion of the case finding effort of the Campaign. During 1958 the Campaign included most of the rural area of the County and as might be expected the incidence was found to be lower than that of the highly populated industrial area surveyed the previous year.

(2) The over all incidence is higher in males than females except for the first two years.

(3) In males there are two peaks of high incidence, in the age groups 16 to 24 and 55 to 64 respectively. But with the passage of years there is a gradual shift of incidence toward the older age group. In females the peak incidence occurs consistently in the age group 16 to 24 years. This pattern of tuberculosis incidence in both sexes is the experience of the rest of the country and indeed of European countries and the American Continent.

Introduction to the Campaign

Preliminary discussions on the need and practicability of a nation wide mass radiography campaign in Scotland had been held at Government level in the Spring of 1955. In February 1956 the Secretary of State for Scotland announced the Government's intention to carry out a nation wide attack on tuberculosis using the mass radiography service as the spearhead of an intensive case finding operation during 1957 and 1958. Following the Secretary of State's announcement, the County Council was informed what part Lanark County was to play in the two year campaign. This meant the allocation to the Council of the number of X-ray unit weeks during 1957 and 1958.

The Department of Health for Scotland was responsible for over all policy and for co-ordination of the several community campaigns. The Scottish Information Office advised on matters of publicity and propaganda. Each community survey was carried out under the joint direction of the local Health Authority and the Regional Hospital Board. In general, the Health Authority was responsible for planning, siting of units and informing the public, while the Regional Hospital Board was responsible for the diagnostic and treatment services.

In each of the defined areas of survey it was expected that at least half the adult population would attend, that an average performance of some 2,000 miniature films per unit per week would be achieved and that there would be some 500 attendances per unit per day. It was also estimated that one fifth of X-ray unit time should be set aside for patients recalled for large films.

The population data used was obtained from the Registrar General's 1951 Census Report. In the new town of East Kilbride allowance was made for the rapid increase of population over the 1951 Census estimates.

The/

The areas selected for survey in the entire national Campaign were based on the study of the levels of tuberculosis morbidity and mortality during the five preceding years in the fifty five local health authority areas. These data based on the 1952-1956 statistics have been commented on by Dr. Ian Macgregor (1961).

The problem of tuberculosis in Scotland has always been essentially that of the four major cities and of the central industrial belt. It was inevitabl that Lanarkshire be chosen as one of the twenty one areas for survey. The reasons for Lanarkshire's black record in tuberculosis have been described in general terms in earlier pages of this paper. What follows is a statistical review of the County's position in 1956 against the background of the tuberculosis problem in the whole country.

Table IX

Mean Annual Scottish Tuberculosis Rates

Per 100,000 of Population 1952-1956

Notifications

All Scotland		126
Cities	Glasgow	above 126
	Edinburgh	
	Dundee	
Counties inclusive of Burghs	Lanark	above 126
	Renfrew	
	West Lothian	

Examination of the statistics of tuberculosis morbidity and mortality for the quinquennial period 1952-1956 reveals that Lanarkshire inclusive of the five Large Burghs accounted for 11.5 per cent of confirmed notifications and/

and 11.8 per cent of deaths from respiratory tuberculosis throughout Scotland.

Exclusive of the five Large Burghs, Lanark County was responsible for 6.8 per cent of confirmed notifications and 6.8 per cent of deaths from pulmonary tuberculosis in Scotland.

Taking the over all tuberculosis problem in Scotland in the pre-X-ray Campaign years, Lanarkshire had not without reason earned the name "The Black County." In respect of tuberculosis morbidity and mortality it was one of the worst areas in Scotland. (Figures I and II)

Mortality

	All Scotland	20
Cities	: Glasgow	above 20
Counties inclusive of Burghs	Lanark, Renfrew, Dunbarton	above 20

Table X

Mean Annual Notification and Death Rates

from Respiratory Tuberculosis in Lanarkshire

Per 100,000 of Population 1952-1956

		Numerator: Notifications Denominator: Deaths
Large Burghs	Motherwell and Wishaw	173/22
	Rutherglen	169/30
	County Council Area	139/22
Large Burghs	Coatbridge	119/23
	Hamilton	112/33
	Airdrie	116/17

THE MASS RADIOGRAPHY CAMPAIGN IN THE COUNTY OF LANARK 1957-1958

It is not proposed to give a detailed and exhaustive account of the organisation, planning and effectuation of the two-year mass radiography campaign in the County of Lanark in 1957 and 1958. In general the pattern of the Campaign in the County was the same as that held in other areas of Scotland in 1957 and 1958. It is intended only to mention the special features of conducting a project of this kind in a county of some 860 square miles in two successive years and to comment on aspects of the Campaign of relevance and interest.

The stage of operations was set in July 1956 when the Department of Health for Scotland intimated to the County Council that mobile X-ray units would be available to the County Health Authority at approximately the same period in two successive year. The precise arrangements were -

(a) 5 X-ray units for 5 weeks from 2nd September to 5th September, 1957.

(b) 6 X-ray units for 2 weeks from 1st September to 13th September, 1958.

(c) 4 X-ray units for 3 weeks from 15th September to 4th October, 1958.

The City of Glasgow established the fashion of setting a target for the number of persons to attend the X-ray units. The City aimed at quarter of a million examinations. As events turned out almost treble that number responded to the appeal for X-ray examination. The tremendous achievement of Glasgow is a noble chapter in medical history. The effort of that great city set the pace for the whole Scottish Campaign. The County of Lanark aimed at a target of 80,000 examinations, approximately 40,000 in each year of the Campaign. In the course of events the target was substantially exceeded to which reference is made on another page.

At the beginning of 1957 the decision was taken on the areas of the County/

County to which the X-ray units would be deployed in the autumn of 1957 and 1958 respectively. As far as the 1957 Campaign was concerned it was decided to conduct the survey in the areas of the Sixth, Seventh and Ninth District Councils. The reason for this decision was threefold. Firstly, other parts of the County had had more recent visits from the mobile X-ray unit based at Motherwell. Secondly, on a population basis these three District Council areas comprised approximately half the population of the County. They were contiguous and for the most part lay on one side of the river Clyde. Thirdly, this plan effected the greatest economy in the use of the X-ray units and the greatest possible co-operation with other Local Authorities taking part in the Campaign.

In 1958 the second stage of the Campaign was held in the remaining half of the County and this comprised the areas of the Second, Third, Fourth, Fifth and Eighth District Councils and the Burghs of Lanark and Biggar respectively. The rural area of the First District Council at the southern corner of Lanarkshire consists of small widely dispersed communities. For that reason it was considered expedient to tackle it for survey purposes as a separate entity. Accordingly, the Lanarkshire mobile X-ray unit based at Motherwell visited the villages in the First District Council area during the last fortnight in August 1958 before the second major Campaign opened.

Having laid the general plan of campaign over the two years, the next major step was to make detailed plans for the first stage which opened in the autumn of 1957. This entailed drawing up a programme in which X-ray unit time was allocated to each community, the early reservation of suitable halls, the formation of local committees, the enrolment of an army of voluntary/

voluntary helpers and the build up of publicity. These measures had one objective to bring together at an appointed time in each locality people desirous of having chest X-ray and the X-ray facilities.

In the enrolment of volunteers and the management of publicity it was early realised that the maximum help would be required from committees in each locality. It was decided that the bodies who were in the best position to sponsor the formation of local committees were the District Councils. Accordingly an approach was made to each District Council and their help was readily promised. The committees which were formed were representative of the medical profession, the churches, political organisations, trade unions, industry, youth organisations, the Women's Voluntary Service, the Women's Rural Institute, the British Red Cross, and many other organisations.

In the 1957 Campaign publicity took the usual form of posters and banners of all kinds, newspaper articles and house to house canvassing. Prize draws were arranged at the discretion of the local committees. The following is the letter which was delivered to every householder. As the first paragraph had to be modified for the second stage of the Campaign in 1958 it is this one which is quoted.

"Dear Friend and Fellow Citizen,

This year we are carrying out the second and last stage of Lanarkshire's share in the Scottish Mass Radiography Campaign. During the second half of August, those living in the more rural part of the County will be visited by an X-ray Unit, and from 18th August to 3rd October, the remaining parts of the County, which were not visited last year, will have their chance.

I should like you to know something about the reasons for it and, therefore, have/

have put forward four questions, with answers.

What Is Mass Radiography?

It is a means of examining the state of health of the lungs and heart of a great many people at a very small cost.

How Is It Done?

You visit the X-ray Unit, give your name and address and are given a card which is fitted into the X-ray machine and photographed along with you. The X-ray shadow of your chest is thrown on a screen and photographed on cinema film. This is later enlarged and examined by a Specialist. You do not need to undress, but should not wear jewellery or metal in your clothing.

Why Should I Be X-rayed?

Most diseases of the chest give an altered X-ray appearance before they produce feelings of illness. In respect of Tuberculosis, which is the illness we have in mind, a cure can be guaranteed provided that the condition is found early enough, that is before you know you are ill, and not only can a cure be guaranteed but the infection will not spread to others, as would inevitably be if you let the disease develop.

Who Should Be X-rayed?

The answer is - Everybody. Nobody is too old. Nobody is too infirm. Nobody can say "I don't matter". Everybody Must Be X-rayed.

In order that your visit to the X-ray unit may give you as little trouble as possible, a list of the times at which they are available is attached. You will not have to undress and the result of these X-rays are entirely confidential.

A small number of X-rays will need to be done again and, in these instances, the persons will be asked to return for a further examination. By far the commonest/

commonest reason for this is that the original small film was not good enough to be read properly. Those of you who are photographers will surely recall that you do not get a perfect picture with every exposure. A very much smaller number than those recalled will be found to have something calling for medical attention, and arrangements will be made for this. The vast majority of people will have the satisfaction of knowing that they are fit, and those who are found to be in any way ill will have the satisfaction of knowing that their illness was discovered at the earliest possible moment so that harm to themselves and to others has been reduced to the minimum".

The above letter, under the signature of the County Medical Officer, was delivered to every household by the voluntary workers who were briefed and given an explanatory booklet on the objectives of the X-ray Campaign, the duties of the voluntary worker and the arrangements in general for bringing together the public and the X-ray Unit. Attached to the letter was a programme giving the sites of the X-ray Units and dates and hours of X-ray sessions.

One of the major difficulties of organising an X-ray campaign in a large County of widely scattered communities was the location of X-ray units and the allocation of X-ray unit time in relation to population. The method adopted was as follows. An estimate of local adult populations was obtained from the census of 1951, and the Police Estimate of 1956. It was assumed that 60 per cent of those might come, and for every 600 people calculated by this means, one X-ray unit was allotted for one day. This gave two factors from which further calculations were made. Firstly, it gave an idea of the total X-ray examinations which might reasonably be expected. This, in its turn, indicated the number of persons likely to be recalled for further examination, which, similarly showed

how/

how many unit/days would have to be set aside for recall sessions. In the final result 93 sessions were planned for miniature films and 27 for recalls. Secondly, it gave an idea of the localities where X-ray units would be likely to operate successfully. With this information it was possible to start looking for actual sites for operations.

Another problem which presented particular difficulties in a county as opposed to circumscribed urban areas was how to put over the aims of the Campaign in an effective way to the several communities, some contiguous, others geographically separate entities. It was realised that traditional ways of publishing the Campaign were not sufficient and that what was required was a personal approach from the medical side. This was achieved in the following manner. Over a period of three months preceding the 1957 and 1958 Campaigns public meetings were convened by the County Councillors and District Councillors in their electoral areas. These were held in the evening and were addressed by a member of the medical staff of the County Health Department. A film was shown on the theme of mass radiography and tuberculosis and this was followed by "question time". In view of the fact that these meetings were held during the holiday season and that they had to vie with out-door activities and the gaining popularity of television entertainment they were well attended and as had been hoped the Campaign "message" was carried by word of mouth into the homes, factories, shops and offices of each community.

The mass radiography campaign in the autumn of 1957 was carried through as planned. Over 48,000 persons attended the X-ray units for examination. Although this number exceeded our target by 8,000 the response was considered only a modest success. At the conclusion of the first stage of the County's Campaign/

Campaign early in October 1957 an interval of ten months elapsed before the second stage in the remaining half of the County opened in late August 1950. An advantage of running a mass radiography campaign in two stages, half the total area of survey one year, half the next, is that when the first stage is completed it allows a respite, time to take stock, to assess one's miscalculations and errors of judgement, to ascertain how certain things might have been done differently with the probability of better results, and perhaps also to find solace in the knowledge that some setbacks were outwith one's control. From this reflection the following points emerged:

(1) Poor attendance at some of the X-ray sites. This was attributed to four factors:

(a) Previous examination in Glasgow. The Lanark County Campaign followed that in Glasgow after an interval of only four months and two weeks. Most of the County residents near the Glasgow boundary had already attended the Glasgow X-ray units. Subsequent analysis disclosed that some 45,000 persons domiciled in Lanark County were examined in the Glasgow Campaign. Had this been realised, less X-ray unit time would have been allotted in the first stage of the Lanark County Campaign to the communities near the Glasgow boundary, and the X-ray units would have been more profitably deployed further afield. Some belated action was in fact taken. The X-ray unit allotted was withdrawn for one day in each case from Dudhill, Baillieston and Bishopbriggs and re-sited in one case in Colvilles Steel Works, in the other cases in Annathill, Cardowan and Bothwellhaugh respectively, villages adjacent to collieries. In each instance the attendance amply justified the change of locus.

(b)/

(b) The location of X-ray units and time of X-ray sessions. It was deliberate policy in the planning of the 1957 Campaign programme to keep to a minimum visits of X-ray units to industrial establishments and to collieries. It was felt that the Campaign was for the benefit of people in general and not for selective groups. Moreover, most of the industries and factories had received routine visits from the Motherwell based X-ray unit and the National Coal Board had their own chest radiography arrangements. In spite of the above argument it was found that when a unit was sited within the gates of a factory or at a pit-head the response from the general public as well as from workers on the spot was exceedingly good and it might have been better if more X-ray units had been based in or near local industry rather than in, for example, a public hall off a side street.

It was not until the Campaign was well advanced that the need was realised for more morning X-ray sessions particularly to serve workers on back shift. Morning Sessions were extremely difficult to arrange because of the limited staff of radiographers and the limited number of X-ray units. The answer might be to have sacrificed in some instances an afternoon session for the sake of a morning session; better still a stand-by staff for special morning sessions. There was no doubt that many people who wanted to attend did not do so simply from lack of opportunity. The radiography and clerical staff did a highly commendable job under conditions of stress and while constantly on the move.

(c) Influenza. The Influenza Epidemic coincided with the Campaign. In the Ninth District Council area which was visited by the X-ray units toward the end/

end of September and at the beginning of October many who might have been examined were unable to attend.

(d) The Weather. This was continuously adverse.

(2) Publicity.

(a) Local publicity. The circulation of letters, canvassing of households, distribution of posters and erection of banners were very well done by the local Committees. But the selection of publicity material should have been more realistic having regard to the ground to be covered and the dispersed nature of the population. Such items as handbills, notices in pay-packets, small posters and banners, bookmarks and car stickers were ineffectual. The lesson to be drawn was that the larger the area of survey, the more dispersed the population, and the shorter the duration of X-ray units at the several sites, the more vigorous and prominent the publicity must be.

(b) Press publicity. The provincial Press were unreserved in their co-operation helpfulness and enthusiasm. The outstanding contribution of the local weekly Press was that they helped to forge the link between the Medical Officer of Health in his basic role of health educator and the local communit for whom he was responsible. Through the media of leading articles and editorials there was a gradual build up of public education on the subject of tuberculosis and the value of chest X-ray examination. After the Campaign was concluded it was through the channels of the provincial Press that the Medical Officer of Health was able to thank people for their response at the X-ray units and to thank the countless number of voluntary workers for their unstinted service.

As far as the content of articles was concerned it was considered the right/

right note had been struck of avoiding the two extremes, on the one hand of producing a brash optimism that only a few people would be found to have tuberculosis and that even if you were one of the few complete cure could be guaranteed in a matter of two to three months, on the other hand of inculcating fear by too much emphasis on a decline in health, a danger to others and chronic incapacity should the opportunity not be seized of being X-rayed.

Of the publicity given by the national daily and evening newspapers to the Campaign little could be said. Their contribution was very patchy. At the close of operations each day attendances at the X-ray units, items of interest and the progress of the Campaign in general were passed to a press agency in Motherwell and from there passed on to the National Press. While it was borne in mind that the latter was under no obligation to publish anything submitted to them, it was felt that a great opportunity had been missed not just to boost the Campaign in the County of Lanark but to sustain a running commentary on the national effort. It appeared that occurrences which rated high news value in a city were of little moment when they were in country districts!

(c) Radio and Television. The course of the Campaign as far as could be ascertained received no mention on television and very little on sound radio in spite of our efforts in that direction. As mentioned above, at the close of each day figures on the progress of the Campaign and points of interest were passed on to the B.B.C., but apart from sporadic reference in "Scottish News" and "Announcements" Programme were ignored.

Although/

Although in 1957 television had not came into its own as the medium par excellence for communicating to the public in general information on matters of health it was felt that there might have been more widespread television coverage on a project which had such auspicious beginnings in Glasgow and was intended to be an all out effort in the cause of health.

(d) Loudspeaker vans. The loudspeaker vans were one of the great successes in the strategy of encouraging the public to attend the X-ray units. This kind of approach had a novel appeal and the only criticism was that there were not nearly enough loudspeaker vans. Difficulty was also experienced in securing suitable persons to broadcast in the afternoons - normal working hours. In the evenings the medical staff of the Health Department gave yeomen's service. In this type of work it was essential that the broadcaster be a person with particular attributes - a strong and pleasant voice, clarity of diction, skill in oratory, a sense of humour, a quick eye to detect an apt moment in the passing scene to allude to the visit of the X-ray unit, a delicate sense of repartee, and not least the ability to give an impression of urgency in his appeal without inhibiting confidence.

(e) Talks to the public. As already mentioned, in the months preceding the Campaign a public meeting was held in every locality when a member of the medical staff of the Health Department gave a talk supplemented by a film on the aims of the Campaign and explained the local arrangements. There was also a hand out of explanatory literature in the form of brochures and pamphlets.

These talks were continued into the weeks of operation although to less/

less extent. Over a long period of months talks of this nature had made heavy demands on evening hours but it was considered the effort had been well worth while. The personal approach to small groups up and down the countryside from the smallest village to the heaviest concentration of population seemed to hold a special place in the strategy of informing the public and encouraging response. Although it had been possible to reach in this way only about one in every two hundred and fifty adults, it was a case of a little leaven that lightened the whole mass. More often that not the talks were reported in the columns of the weekly Press, and this also gained a wider public.

The only criticism was that not enough talks had been given and that in some localities they had not been given proximate to the actual visit of the X-ray units. The answer to this was not difficult to find, namely to enlist more of the medical staff of the Health Department to give the talks, and in consultation with the County Councillors and District Councillors to plan the programme of talks to the public more consistent with the visit of X-ray units to each locality in the 1958 Campaign.

(f) Note on Content of Talks to the Public. Since the inception of the National Health Service doctors in the Public Health Service had received little opportunity to further their knowledge and experience in the clinical aspects of tuberculosis and mass radiography. Account had to be taken of this when the Health Department of the County Council was faced with the challenge of giving talks to the public on the subject of tuberculosis and the X-ray Campaign. For this rather special task volunteers from the staff/

staff of medical officers were called and they rose to the occasion superbly. Each was briefed on general lines what to say but at the same time was strongly encouraged to bring his own personality to the task and develop his own line of approach. He was given an assessment of the general picture of tuberculosis not only in relation to Lanark County but in reference to its impact on the country as a whole. Modern methods of prevention, diagnosis and treatment were reviewed. (This subject was considered at some length and reference is made to it in the next paragraph). The arrangements for the Campaign were considered in detail always with particular reference to the districts in which talks were to be given. Finally an indication was given of the kind of questions people asked on tuberculosis and chest X-ray.

The more clinical aspects of tuberculosis were reviewed under the following headings:- Find; isolate; treat; rehabilitate; prevent; educate.

Find:- The role of the family doctor, the chest clinic and group miniature radiography surveys.

Examination of contacts in the family circle and at place of work.

The place of tuberculin testing at child welfare clinics and routine school medical inspections. The significance of a positive reaction. Chest X-ray examination of all positive reactors.

Isolate:- The significance of bacteriological findings in the sputum and on laryngeal swab.

Hospitalisation/

Hospitalisation of the acute infectious case. The problem of the drug resistant "old chronic". For the patient under domiciliary care, separate bedroom and a high standard of hygiene in the home are of first importance.

Treat:- General measures directed to improving the state of health are very important. Some of the older forms of treatment are now discarded e.g. artificial pneumothorax and pneumoperitoneum, phrenic paresis and thoracoplasty. Surgical resection is still necessitated in a few selected cases. The mainstay of therapy is now the new drugs which have effected a revolution in prognosis both as regards cure and duration of illness. Streptomycin was introduced in 1949, P.A.S. in 1950 and Isoniazid in 1952. These three drugs have virtually eliminated mortality, rendered the infectious case non-infectious, and reduced the period of illness from the prospect of years under the sanatorium regimen to a few months. For the recovered case observation at the chest clinic for a period of years is still required. The drug resistant chronic infectious case is a problem to clinicians and public health authorities alike.

Prevent:- "Tuberculosis is a social problem with medical aspects." Measures must constantly be directed to raising the general standard of health in the community. This means better/

better housing and better working conditions, less herding of people together both at home and in the factory, less squalor and poverty, less undernutrition and malnutrition, more outdoor recreational facilities, steady employment in a stable economy; in fact it means the kind of environment in which powers of resistance to infection with the tubercle bacillus, latent in everyone, are given the best chance to develop.

Specific measures include B.C.G. vaccination on a selective basis; chemoprophylaxis where indicated of the strongly positive tuberculin reactor and of the case of primary tuberculosis; and routine miniature radiography of groups where there is known to be a high incidence or a special risk of acquiring infection.

Rehabilitate:- The word means to restore to a former condition. It means therefore helping someone who has had a long and incapacitating illness to find his feet again, to return to his old job, to a new one if need be, and to resume his social contacts. Particularly in the case of tuberculosis it means helping the former patient to come to terms with the public attitude which traditionally has looked askance at tuberculosis and discussed it only in whispers.

The efficacy of modern treatment has rendered unnecessary special rehabilitation schemes with sheltered employment. Each case should be treated on its own merits and all the help/

help from the social services brought to bear on the problem. On the financial score, special allowances are available from the Ministry of Pensions and National Insurance or from the National Assistance Board. The Health Authority also operates a rent rebate scheme.

Educate:- In any programme of health education reference to tuberculosis must find a high place. This is a task which falls particularly to the doctor, nurse and health visitor in the public health service. While the essential facts about tuberculosis as a communicable disease must be explained the emphasis should be that the best insurance against illness from tuberculosis is to strengthen the body's natural defences by a healthy mode of living. Young people in their late teens and early twenties are apt to take health for granted whereas it is a heritage which should be safeguarded. They should be encouraged to keep before them the virtue which the Greeks of old called Sophrosyne: an inner harmony and moderation in all things.

After the preliminary discussions with the medical staff as outlined each medical officer gave a series of talks to the public wherever they could be arranged. In general each speaker followed the pattern of the Letter to Householders which went out under the signature of the County Medical Officer: "What is mass radiography?" "How is it done?" "Why should I be X-rayed?" and "Who should be X-rayed?" Attention was invited to these four questions and according to the particular circumstances, the type of audience, and the expertise/

expertise of the speaker there was variation on the length and mode of presentation of the answers.

To the question, "What is mass radiography?" explanation was made that it was a means of X-raying the chest of a great many people in a short space of time at relatively small cost. A standard 14" by 17" chest film was demonstrated along with a roll of 35 mm. film. As someone invariably raised the question of too frequent X-ray examinations assurance was given that there was no hazard to health but that it was not necessary for anyone to attend again if he had been X-rayed within the previous nine months, that it was inadvisable for an expectant mother to have a chest X-ray on small film, and that in the case of children it was not possible to take a sufficiently good picture of the chest.

On the question, "How is it done?" the procedure was described of booking in to the X-ray van, giving personal particulars to the clerkess, 'no undressing' apart from removing overcoat and jacket, stepping on to the X-ray machine for a few seconds, and receiving the result within a few days. One or two points were given special emphasis: the entire examination was confidential; recall for a large film was sometimes necessary but that the most likely reason for this was that the first film did not give a clear picture; and should a person be found to have tuberculosis then the chances of complete cure in a few months with modern methods of treatment were exceedingly good and that he would have the assurance that immediate and effective treatment would prevent him passing on any further infection to his family or to his associates at work.

"Why should I be X-rayed?" This self imposed question was the most difficult to answer. First, an appeal was made to a sense of responsibility in attending/

attending for a check-up, responsibility for one's own health, for the health of one's family and associates at work, and for the health of the community. Secondly, reference was made to the history of tuberculosis. From earliest times it had been a scourge of mankind; until recent years it had been the cause of more suffering, more hardship, more incapacity for work and enjoyment, more blighted hopes and unfulfilled ambitions, more social distress and more economic drain on the country than any other single disease; but now all that was changed; medical science had at last triumphed and if we all played our part we could see the end of tuberculosis and get rid of it entirely from our midst. Thirdly, recognition was made of the fear of tuberculosis. Down the years people had always abhorred this disease. To be labelled tuberculous was a stigma. What was it people said of it, "Once T.B., always T.B." and "Why should this happen to me. There has never been anything like this in my family. To many people, to be told they had T.B. was the end of everything. They feared dying from it, feared being shut away perhaps for years in a sanatorium in the country, loss of income, loss of personal esteem and social status.

In talking to members of the public whether collectively or singly the fears they felt or expressed had to be acknowledged and then firmly cast out. The traditional attitude to tuberculosis had to be replaced by the conviction that there was no longer any need to dread this disease because thanks to powerful new drugs it could be readily and quickly cured. It was felt desirable to drive home the efficacy of modern treatment by saying something about the new drugs, streptomycin, P.A.S., and isoniazid, when they were discovered and how they were used, by explaining that older methods of treatment such as artificial pneumothorax (a term with which most people were familiar) and operations on the lung/

lung had now given place to these new drugs. Finally most people had sad memories of relatives or friends who had spent a large slice of their lives in a hospital or sanatorium and perhaps at the end of it all were respiratory cripples Assurance was given that a long spell in hospital away from home was a thing of the past, that anyone whose condition was not infectious would be treated at home under the supervision of their own doctor and that where the condition was recognised early there might be no need to be off work at all. Finally it was stated that the vast majority of people who came for check up would be found to be healthy.

It may be thought that the above presentation was much too gloomy on one score and much too optimistic on another but the objective was to present to the public eye a striking contrast between the traditional lay view of tuberculosis and the current medical view. If people in all walks of life could not be helped to see this then there was little point in trying to justify the X-ray Campaign at all!

"Who should be X-rayed?" The answer given was "Everybody." This was then qualified by explaining that on the small film it was not possible to take a good picture of a child's chest and that there was a more suitable method of detecting tuberculosis in children in whose age group, the under fourteens, the trouble was comparatively rare. At this point brief reference was made to the primary dose of tubercle bacilli and the tuberculin test. Expectant mothers were not asked to attend because of the slight risk of radiation to the unborn baby. They were advised to keep in touch with their own doctor who would arrang a large film if necessary. Anyone who had been for a chest X-ray in recent months was told he need not attend a second time. Having said this, emphasis was/

was again placed on everyone else coming for check-up. "Nobody is too old to have a chest X-ray. Nobody can say, 'I don't matter'. Grannie and grandpa must come as well as the young folk. Even if a person feels in the very pink of condition and can run a mile in four minutes he should still have a check-up. Tuberculosis is no respecter of persons, class, wealth, professional or social prestige, political affiliation or religious persuasion!"

In the presentation of a talk the speaker endeavoured to hold a fine balance between on the one hand impassioned earnestness, realism and high intent and on the other buoyancy, superficiality and care-free indecisiveness. Sincerity, enthusiasm and humour, that was never misplaced, seemed to strike the right cord.

(3) The "Bus-office." In some localities, particularly in new housing estates and in rural villages, it had been difficult to find a suitable hall for the scene of operations. The idea of the "Bus-office" was to make the X-ray unit independent of premises. To this end a school bus was purchased from the Education Authority, and adapted to operate back to back with the X-ray van. Some of the seats were removed and replaced by a table at which the clerkess could work; the roof was raised; extra lighting and heating installed; and a doorway was made on the off-side behind the driver's seat from which led two or three steps flanked by hand rails. Persons to be X-rayed entered by this door and after particulars were taken left by the rear door to enter the X-ray van directly.

The "Bus-office" proved a valuable adjunct and permitted operations on a number of sites which could not otherwise have been adequately supplied. Under certain/

certain circumstances it provided the only means whereby examinees could be booked into the X-ray van. Only one factor, the weather, militated against its greater use. The bus could not combine the functions of an office and large waiting room. When the weather was cold or wet as it most often was in September and early October 1957 the queue of persons awaiting their turn for X-ray were without shelter. The remedy was to have a mobile waiting room. This was found in the shape of a large mobile workshop, the property of the County Works Department. The vehicle resembled a mammoth furniture removal van and required little modification to serve as a waiting room and shelter for members of the public. It was pressed into service in the 1958 Campaign along with the "Bus-office" and proved a great success. In fact the services of the "Bus-office" and the mobile waiting room were requested for X-ray campaign and group radiography sessions well outwith the confines of Lanarkshire.

When the first stage of the Campaign in the County of Lanark was concluded, an endeavour was made by one means or another to thank the countless numbers of people, those who acted on behalf of official organisations and those who helped on their own, who had given generously of their time, interest and energy to make the Campaign a success. One of the most gratifying features of the Campaign was the spirit of team work that existed among persons from so many diverse walks of life.

In these days when the different branches of the Health Service appear to be so disjointed, the Campaign in Lanark County as elsewhere demonstrated that the Chest Service, the body of general practitioners, the Department of Health, and the local Health Authority could act together in a whole-hearted and concerted/

concerted effort to deal a blow at a disease which had been elusive to medical attack for generations.

In January 1958 plans were set afoot for the second stage of the X-ray Campaign in the County. The region to be surveyed which collectively housed half the population of the County not yet examined was that of the First, Second, Third, Fourth, Fifth and Eighth District Councils together with the Burghs of Lanark and Biggar.

The general organisation and planning of the Campaign followed the same lines as in the previous year, but on many points of detail experience dictated a different line of approach. To put this another way, strategy was the same, tactics were often quite different.

One of the first matters to receive attention was the location of X-ray units in relation to population. From the census of 1951 and Police Statistics of 1956 it was possible to ascertain three basic facts (1) total population over 14 years in the region of survey; (2) population of each of the six District Council areas and of Lanark and Biggar; (3) population of each sizable community within District Council areas.

With the exception of the area of the First District Council, it was ascertained that 116,415 persons were eligible for chest X-ray examination. The Department of Health for Scotland informed the County Health Department that 116 Unit days were available for general X-ray examinations. Allowing for recall sessions, this worked out at 90 Unit days for miniature radiography. Thus the available population per Unit day was 116,415 ÷ 90 = 1,293.

The allocation of Unit days to each District Council area was worked out as follows:-

District/

District	Population over 14 years	Unit-Days
No. 2	11,396	11,396 ÷ 1,293 = 9
No. 3 and Lanark Burgh	22,887	22,887 ÷ 1,293 = 17
No. 4	25,952	25,952 ÷ 1,293 = 20

And so on in respect of the other District Council areas.

The next step was to ascertain how best to use a given number of Unit days within each District Council area. This was done as follows, taking No. 2 as an example:

District	Community	Population over 14 years		Unit Days	
		Area	District Total	Area	District Total
2	Lesmahagow	3,201		3	
	Coalburn	1,662		1	
	Douglas	2,842		2	
	Blackwood	3,691	11,396	3	9

Each of these two communities took in smaller adjacent communities.

With the above information it was possible to start looking for actual sites for operations. Each set of premises had to be surveyed for suitability from three aspects: (1) accessibility to the public; (2) technical operation of the X-ray unit; and (3) Police approval. Thereafter permission to use the premises was secured. This work was done as in the 1957 Campaign in association with the Organising Secretary of the parent Motherwell Unit. Where applicable, sites were visited and approved by the Organising Secretaries of the visiting Units.

The County Council followed the same procedure as in the previous year and invited the District Councils of the First, Second, Third, Fourth, Fifth and Eighth and also the Town Councils of Lanark and Biggar to act for them locally. The District Councils broke the organisation down to the level of electoral divisions, in each of which the local members organised Committees whose main functions were the enrolment of volunteers, the arrangement of publicity and the convening of public meetings which were addressed by the medical staff of the County Health Department.

The organisation and execution of an X-ray Campaign in the area of the First District Council presented a special problem. Because of the dispersed nature of the rural communities and the distance of these from County Headquarters in Hamilton and from Headquarters of the Mass Radiography Service in Motherwell, it was considered expedient to deal with this survey separately from that in the other District Council areas. It was therefore decided that the parent mobile X-ray unit based at Motherwell should conduct the survey during the last fortnight in August before the major campaign opened on 1st September. This was done and considering this was our first experience of operating in a distinctly rural area of large extent and of dispersed villages, hamlets, and farms, the result exceeded all expectations. Three factors contributed to the success of the venture; the first was the splendid work done by the local Committees in organising relays of buses and cars to bring people to the X-ray unit from outlying hamlets and farms; the second was that the service of the "Bus-office" and "Waiting Room" made it possible to seek advantageous sites independent of premises; and the third was the use of electronic hand megaphones. The latter was a relatively untried medium of "Tolling/

"telling the people" about chest X-ray. What happened was that the medical staff of the Health Department and the local members of the County Council and of the First District Council joined forces and went out two by two in private cars and broadcasted the visit of the X-ray unit. This direct "personal" approach to call folk out to visit the Unit received unqualified approval and had the kind of prodding effect that other methods of publicising lacked.

At the conclusion of the survey in the south corner of the County forces were gathered for the second stage of the major Campaign which opened on 1st September. At its conclusion on 4th October 59,761 persons had attended the X-ray units. This was 11,371 persons more than in the 1957 Campaign.

The 1958 Campaign was a more satisfactory endeavour than that in 1957 and justified the use to which previous experience was put. The features of the Campaign which in retrospect seem to warrant comment are as follows:-

(1) Adequacy of X-ray facilities. Far more people were willing to come for chest X-ray examination than the limited number of X-ray units in the time available were able to handle. There were reports from the more busy sites that many people turned up for X-ray but on seeing the long queues and perhaps hard pressed for time were unable to wait. The policy with regard to the total ration of X-ray facilities for the Lanark County survey was outwith the hands of the Health Authority although representations on this point were made to the Department of Health for Scotland.

Contrary to the 1957 Campaign, the dilemma of having to consider withdrawal of an X-ray Unit from any one area because of poor public response was not one which had to be faced. Calculations of the Unit time necessary for localities on the Glasgow-Rutherglen-County of Lanark boundary proved to be reasonably correct./

correct. (The Rutherglen Campaign had preceded that in the County by three and a half months). The general plan for the allocation of X-ray units was satisfactory. This reflected the soundness of allocating X-ray unit time not merely on the strength of local populations but having regard to X-ray facilitie which existed in other places previous to or concurrent with our own. (The X-ray Campaigns in the Burghs of Airdrie and Coatbridge had just preceded that in the County and the Campaign in the Burgh of Motherwell and Wishaw ran almost concurrently with that in the County).

As in the 1957 Campaign evening sessions were found to be the most profitable. By contrast, however, with the previous year's campaign, morning sessions were a much more successful venture. The reason for this is quite simply that experience gained in the 1957 Campaign enabled the planning, organisation, and publicising of specially arranged sessions to be carried out more effectively. The policy was to site an X-ray unit at a strategic point in an area where there were strong indications, short of an actual canvass, that the public response, particularly of those on backshift would be good. Once the decision was taken to lay on a special session at a particular area, local representatives worked very hard in co-operation with Public Health staff to put into effect high pressure publicity. The best example of this "combined operations" was Coalburn, a mining community, where the X-ray unit was besieged on its arrival at 10.30 a.m. and where 384 persons turned out for X-ray before 1.30 p.m.

The average response from all specially arranged sessions was 205 examinees as compared with an average of 115 examinees in the 1957 Campaign.

One of the most disappointing features of the 1957 Campaign had been the poor/

poor attendance for X-ray examination of the aged, infirm and disabled. The laxity of special transport for them was in very large measure put right in the 1958 Campaign.

As regards mechanical breakdown, the X-ray units operating had taken a "hammering" in the previous eighteen months since the inception of the Glasgow Campaign in March 1957. The surprising thing was that mechanical breakdown did not occur much more frequently. In fact, failure of equipment led to the loss of only four sessions, equivalent to two unit days. As compared with the 1957 Campaign the eventuality of breakdown was foreseen in as much as alternative arrangements were made or additional sessions provided at a later date.

(2) Publicity.

(a) Local Publicity. On the experience of the first stage of the Campaign in 1957 when certain items of publicity were found to be ineffectual, the decision was made not to use again the following:-

small posters and banners, slips for pay packets, stickers for car windows bookmarks and shop window displays.

All the posters and banners used were of the largest size available and only those posters were used which could be overprinted with the local programme. The number of these was considerably stepped up. Local printers readily co-operated in preparing large posters at short notice for specially arranged sessions and local headmasters prepared and handed out to the school-children brief notices to take home advertising a specia X-ray session.

(b) Press Publicity. As in 1957, the national daily papers almost entirely ignored the Campaign. But the interest, co-operation, and support of the local/

local weekly papers were beyond praise. In addition to articles and time tables of the Campaign, photographs of X-ray units at work and other activities appeared regularly in the local Press.

(c) Radio and Television. As in 1957 the course of events received little notice on sound radio and none at all on Television.

(d) Broadcasting with Loudspeaker Equipment. During the 1957 Campaign two loudspeaker vans were in daily use supplemented where practicable by local enterprise. These had a limited value. In practice vans were found to be uneconomical, difficult to staff, difficult to service and not very effective. For the 1958 Campaign the decision was made to hire from the Pye Company in Glasgow hand-operated electronic megaphones known as Transhailers. Throughout the seven weeks of the Campaign these instrument were operated for the most part by the medical and administrative staff of the Health and Welfare Department, ably assisted when necessary by County Councillors, District Councillors and voluntary workers. There were very few X-ray sessions when a team was not on the spot to do some broadcasting These instruments proved to be very effective. Perhaps their greatest value lay in advertising special X-ray sessions arranged at short notice.

(e) Family doctors, the churches, British Red Cross, W.V.S., W.R.I., Cinema Managements, National Union of Mine-Workers and other Trade Unions, Ratepayers Association, Private Omnibus Companies, local Army Commands - as in the 1957 Campaign - gave invaluable help in publicising the Campaign.

(3) Music at the sites. The relaying of Scottish dance music from gramophone records at the X-ray units was something of an experiment. The idea was twofold, first to focus attention on the X-ray unit, and secondly to counter-balance/

the deep seated and unexpressed fear associated in the minds of many people with chest X-ray and tuberculosis. It may have been just coincidence but at the locations where this was tried out, consistently high attendances were recorded!

(4) The "Bus Office" and "Mobile Waiting Room". These two operating together proved an indispensable adjunct in permitting operations on a number of sites which could not otherwise have been adequately served. They were in constant use throughout the First District Council area and it is difficult to see how this community could have been served at all without some kind of "mobile" accommodation for people waiting their turn to be "booked in" to the X-ray van. In the Campaign in the other District Council areas the use of these two vehicles made it possible to set up X-ray facilities at focal points in housing schemes where no halls were available.

(5) Weather. Except for a few rough spells, the weather was kinder than during operations in 1957.

(6) Prizes. The policy of the County Council on the question of prizes was to leave this to local enterprise. As in 1957 the Campaign in 1958 was by and large a "no prize" Campaign. The experience of 1957 was again borne out that the provision or non-provision of prizes had little effect on the numbers X-rayed. If the County Council had been prepared to rate prize inducement of first importance in propaganda and to that end set aside a considerable sum of money for the purpose there is no doubt that many more people would have attended for X-ray. More on ethical grounds than those of simple expediency the idea of a major prize incentive made no appeal to the County Council or to those more directly concerned in organising the Campaign.

(7) County Council and District Council Elections. 1958 was the triennium for/

for County Council and District Council Elections. It was feared that this event would seriously interrupt the even tenor of progress in planning the Campaign and especially in convening meetings in each locality with representatives of the respective Councils and with the public. This did not happen. In fact, the Elections in the several areas acted more as a spur to the progress of the Campaign than as an awkward interlude. After the result of the poll was declared, it was evident that some "new blood" had been added to the County Council and District Councils alike; consequently it was necessary in a few localities to retrace steps and go over the ground again of expounding the Campaign to the new members. But as so often happens under similar circumstances the task was made very much lighter by the keen interest and ready enthusiasm of new and successful candidates.

(8) The Campaign in the new town of East Kilbride. X-ray units were strategically placed in the centre of the old village and in the new housing estates round the perimeter. At first sight it seemed the over all response from East Kilbride was disappointing but on careful reflection it was realised that two errors of judgement had been made even before the Campaign got under way. The first mistake was that only one public meeting was called and that was in the old village. It should have been realised that the village was no longer the focal point of a new and expanding township and that it would be essential to enlist the interest of the entire populace of East Kilbride by holding public meetings in each of the well defined housing estates which had their own community life and interests. The second miscalculation was that too much X-ray unit time was allotted to East Kilbride and even that was ineffectively portioned out. While the X-ray unit sited in the former village centre/

centre was standing idle, the other five X-ray units strategically placed in the new housing districts had more business than they could hope to deal with in the time available. As in other areas of the County, X-ray units were deployed on a population basis but one factor was not given enough weight. This was that of the great influx of people into East Kilbride in 1957 and the first half of 1958 the vast majority had come from Glasgow and had already been X-rayed in the Campaign in that city.

The Lanarkshire X-ray Campaigns in Perspective.

With the exception of the Burgh of Hamilton which had an X-ray Campaign in November 1956, all the other Health Authorities in Lanarkshire took part in the Scottish Campaign of 1957-1958 and each Health Authority was responsible for the Campaign within its own administrative area. This meant that in 1957 there was one Campaign, Lanark County (Part), and in 1958 five distinct Campaigns, Rutherglen Burgh, Coatbridge Burgh, Airdrie Burgh, Motherwell and Wishaw Burgh, and Lanark County (Part). If we include the Burgh of Hamilton, then over approximately a two-year period, from the beginning of November 1956 to the beginning of October 1958, the six Health Authorities within the confines of Lanarkshire ran their own Campaigns within their respective administrative areas. In only two instances were Campaigns run concurrently. The first was in the case of the Burghs of Coatbridge and Airdrie; the second was that of Lanark County (Part) and the Burgh of Motherwell and Wishaw. By and large it would be true to say that the effort to get the total adult population of Lanarkshire X-rayed, about 450,000 persons in the combined landward-burghal area was organised and planned by six Health Authorities, each one acting independently and at a different interval from most of the others, over a span of two years.

It/

It is always easy to be wise after the event especially when one did not have a conspectus of the whole problem and did not have to reconcile a multitude of opposing factors. Nevertheless, it is the view of the writer that it would have been better had Lanarkshire (County Landward and Burghal) been treated as one area for the purposes of the Scottish Two Year Campaign against Tuberculosis in 1957-1958. This line of approach would have necessitated the closest working partnership between the several Health Authorities and complete agreement on all the principal issues.

The most advantageous time to stage the Campaign would have been in the interval between the end of April and the middle of June 1957. This would have allowed for a respite after the Glasgow Campaign and would have enabled recall sessions to be held and chest clinic assessment made before the holiday season was much under way. The Glasgow Campaign in the spring of 1957 had brought public interest and enthusiasm to an unprecedented peak. If the Lanarkshire Campaign had almost immediately followed, the impetus behind the peak would have swept over the door-step of Glasgow to its largest neighbour. Furthermore, vast resources in technical and administrative staff and in X-ray plant had come from all corners of the United Kingdom for the crusade in Glasgow. Some of the weight of the English mass radiography service could have been deployed in Lanarkshire in May and June. However, even if additional radiography staff and X-ray plant had not been available, the Campaign in Lanarkshire could still have been staged on the strength of Scottish resources in the mass radiography service. Limitation of staff and equipment would simply have meant the operation would have taken longer to complete but would not have altered the design to throw all forces into action in one area at a time and to make an orderly advance until the whole of Lanarkshire had been visited./

visited. This scheme would have permitted a better disposition of X-ray units more in accord with the size of local populations rather than in strict observance of Local Authority boundaries, and would have obviated overlapping of X-ray facilities which was inevitable when two Health Authorities acted independently. Transport arrangements to bring people to the X-ray sites from outlying villages, having particular regard to the elderly, the infirm, and the handicapped, would have been organised on a much sounder footing. The manifold ways of publicising the Campaign would have been co-ordinated thus enabling publicity to be directed with much greater impact to one area at a time. It is more than likely that greater help would have been forthcoming from national daily papers and from the radio and television authorities if Lanarkshire as a whole had participated in one mass radiography campaign instead of so many separate entities in a series of discrete campaigns.

It is the writer's contention that the age old problem of tuberculosis in Lanarkshire and the continued high prevalence of the disease well above the national average warranted a unified effort from the six Health Authorities in the Mass Radiography Campaign as outlined above and conducted on a scale not much less than that in Glasgow. It may be argued that this is all very plausible in theory but would not have been practicable. There the matter rests.

TABLE XI.

County of Lanark Survey 1957-58

Distribution of Adult Population
(1951 Census)

Age Groups (Years)	Percentage Distribution of Adults	
	Males	Females
15-	14.3	15.5
25-	14.6	14.9
35-	14.2	14.1
45-	16.7	17.3
60+	11.8	12.7
All ages	71.6	74.5
Both sexes	100	

Table XII

Two-Year Mass Radiography Campaign - Lanark County 1957-1958

Numbers Examined in Age and Sex Groups in Each Survey

	Number of Residents Examined															Total Examined Residents and Non-residents
	Males							Females						Both Sexes		
	- 14	15 -	25 -	35 -	45 -	60 +	Adults	- 14	15 -	25 -	35 -	45 -	60 +	Adults	All Ages	Adults	
Lanark County (Part) 1957	1071	4574	4204	4394	5415	2797	21404	946	5069	5148	5410	5812	2865	24338	47759	45742	48390
Lanark County (Part) 1958	1178	5342	5056	5206	6276	3527	25408	1161	6071	6682	6691	7709	4277	31433	59180	56841	59761
Lanark County 1957-58 surveys combined	2249	9916	9260	9600	11691	6324	46812	2107	11140	11830	12101	13521	7142	55771	106939	102583	108151
Percentage Examined Based on 1951 Census	5.2	44.4	41.8	44.2	45.7	35.3	42.7	5.1	44.7	49.4	53.9	48.6	34.2	46.4	34.04	44.64	47.03

From a study of Table XII the following points emerge:

1) In the combined survey of 1957-1958 45 per cent of the adult population of Lanark County attended for chest X-ray examination. It is estimated that 45,000 Lanarkshire residents attended the Glasgow X-ray Campaign in the Spring of 1957; this figure represents 20 per cent of the adult population. In all, therefore, 151,939 people resident in Lanark County were X-rayed during 1957-195[illegible] To be more precise, the number of adults aged 15 years and upwards, who were X-rayed was 147,583. This represents about two thirds of the adult population.

2) The lower and middle age groups figure to a much greater extent among those X-rayed than the elderly. This was one of the disappointing results of the Campaign in view of the modern trend of tuberculosis age incidence. On the other hand the response from the other high incidence age group, females between 15 and 30 years, was quite good but should also have been better. One wonders if special propaganda had been directed to these two age groups the result might have been to scare even more of them away from the X-ray units!

TABLE XIII

Two-Year Mass Radiography Campaign - Lanark County 1957-1958

Attendances, Recalls and Disposal of Patients - Residents and Non-Residents - Number and Rate per 1,000 Examined

	Attendances	Recalls for Large Film		Referred to Chest Physicians		Referred to General Practitioners		Tuberculosis Cases Admitted to Hospital	
		Number	Rate/1000	Number	Rate/1000	Number	Rate/1000	Number	Rate/1000
Lanark County (Part) 1957	48390	2234	46.2	904	18.7			43	0.9
Lanark County (Part) 1958	59761	2548	42.6	760	12.7	741	12.3	57	1.0
Lanark County 1957-1958 (Composite figures)	108151	4782	44.2	1664	15.38			100	0.92

TABLE XIV

Two-Year Mass Radiography Campaign - Lanark County 1957-1958

Yield of New and Previously Known Cases of Respiratory Tuberculosis

Number and Rate per 1000 Examined

	Yield of Respiratory Tuberculosis among Residents											
	New Cases									Previously Known Significant Cases		
	Active		Observation		Significant			Confirmed Bacteriologically				
	No.	Rate	No.	Rate	No.	Rate	Per Cent Active	No.	Rate	No.	Rate	Per Cent of significant yield
Lanark County (Part) 1957	76	1.59	115	2.41	191	4.0	39.8	22	0.46	75	1.57	28.2
Lanark County (Part) 1958	84	1.42	86	1.45	170	2.87	49.4	25	0.42	48	0.81	22.0

From a study of Table XIV the point emerges that the percentage of active cases of tuberculosis was higher in the 1958 Campaign than in the 1957 Campaign but the total yield of significant cases was lower. This is the result one would have expected in view of the fact that the 1958 Campaign embraced a larger proportion of rural communities. Although tuberculosis is much less prevalent in rural areas, proportionately there may be more active cases simply because they are less readily brought to light than is the case in more industrialised areas.

TABLE XV

Lanark County X-ray Campaign 1957-1958

Tuberculosis

Number and Rate per 1000 Examined

Respiratory Tuberculosis		New Cases					Previously Known Cases Active & Observ.
		Residents			Non-Residents	Total	
		Males	Females	Both Sexes			
Active	Number	87	73	160	2	162	123
	Rate	1.78	1.28	1.51	3.44	-	
Observ.	Number	120	81	201	-	201	
	Rate	2.52	1.42	1.93			

In the two years of the Lanark County Campaign, the rate of active respiratory tuberculosis was found to be 1.51 per 1000 examinees. In the entire Scottish Campaign the rate was 2.35 per 1000. The respective rates for observation cases were, Lanark County 1.93, Scotland 4.26.

TABLE XVI

Two-Year Mass Radiography Campaign - Lanark County 1957-1958

Persons found suffering from Active Respiratory Tuberculosis - Numbers and Rates per 1000 Examined in Age and Sex Groups

Residents and Non-Residents - New Cases Only

		Male Residents							Female Residents							Both Sexes - All Ages		
		- 14	15 -	25 -	35 -	45 -	60 +	All Ages	- 14	15 -	25 -	35 -	45 -	60 +	All Ages	Residents	Non-Residents	Grand Total
Lanark County (Part) 1957	No.	1	10	7	7	10	6	41	2	12	8	6	3	4	35	76		76
	Rate	0.93	2.19	1.67	1.59	1.85	2.15	1.82	2.11	2.37	1.55	1.11	0.52	1.40	1.38	1.59		
Lanark County (Part) 1958	No.	-	7	9	12	13	5	46	-	11	11	8	6	2	38	84	2	86
	Rate	-	1.31	1.78	2.31	2.07	1.42	1.73	-	1.81	1.65	1.20	0.78	0.47	1.17	1.42	3.44	1.44

In males the pattern of tuberculosis incidence during the 1957 Campaign was typical with two peaks of incidence, one in early adolescence, the other in middle and later years. In the 1958 Campaign the male incidence of tuberculosis was highest in the middle years of life.

In females the pattern of tuberculosis incidence in both the 1957 and 1958 Campaign was typical of the trend down the centuries, a high peak in early adolescence falling off toward older age groups.

TABLE XVII

Two-Year Mass Radiography Campaign - Lanark County 1957-1958

Persons Presenting Radiological Evidence of Respiratory Tuberculosis of Doubtful Activity Requiring Observation

Number and Rates per 1000 Examined in Age and Sex Groups - Residents and Non-Residents

New Cases Only

		Male Residents							Female Residents							Both Sexes - All Ages		
		- 14	15 -	25 -	35 -	45 -	60 +	All Ages	- 14	15 -	25 -	35 -	45 -	60 +	All Ages	Residents	Non-Residents	Grand Total
Lanark County (Part) 1957	No.	2	11	13	15	25	9	75	-	2	13	16	8	1	40	115	-	115
	Rate	1.87	2.4	3.09	3.41	4.62	3.22	3.34	-	0.39	2.53	2.96	1.38	0.35	1.58	2.41	-	-
Lanark County (Part) 1958	No.	1	3	11	10	12	8	45	-	4	10	7	13	7	41	86	-	86
	Rate	0.85	0.56	2.18	1.92	1.91	2.27	1.69	-	0.66	1.50	1.05	1.69	1.64	1.26	1.45	-	1.44

In males, taking the 1957 and 1958 Campaigns together, the present trend of tuberculosis was reflected, a peak in early adolescence sometimes sustained but always reaching a much higher peak in middle and later years.

In females, the trend was toward a high incidence in middle life, and this seems to reflect a comparatively recent trend of tuberculosis in that the graph of incidence for females is assuming "male" characteristics.

TABLE XVIII

Lanark County X-ray Campaign 1957-58

New Cases of Respiratory Tuberculosis

(By Sex and Age Groups)

Age Groups	Active Cases			Observation Cases			Per Cent Active
	Rate Per 1000	Number	Per Cent	Rate Per 1000	Number	Per Cent	
Males							
-15	0.93	1	0.6	1.36	3	1.5	25
15-	1.75	17	10.6	1.48	14	7.0	54.8
25-	1.73	16	10.0	2.64	24	11.9	40
35-	1.95	19	11.9	2.67	25	12.4	43.2
45-	1.96	23	14.4	3.27	37	18.4	30.8
60+	1.79	11	6.9	2.75	17	8.5	39.3
All Males	1.78	87	54.4	2.52	120	59.7	42
Females							
-15	2.11	2	1.3	-	-	-	100
15-	2.09	23	14.4	0.53	6	3.0	79.3
25-	1.6	19	11.8	2.02	23	11.4	46.3
35-	1.16	14	8.8	2.01	23	11.4	37.8
45-	0.65	9	5.6	1.54	21	10.4	30
60+	0.94	6	3.8	1.0	8	4.0	42.9
All Females	1.28	73	45.7	1.42	81	40.2	47.4
Both Sexes	1.51	160	100	1.93	201	100	44.3

FIG 3 LANARK COUNTY X-RAY CAMPAIGN 1957-

ACTIVE RESPIRATORY TUBERCULOSIS

AGE AND SEX SPECIFIC RATES

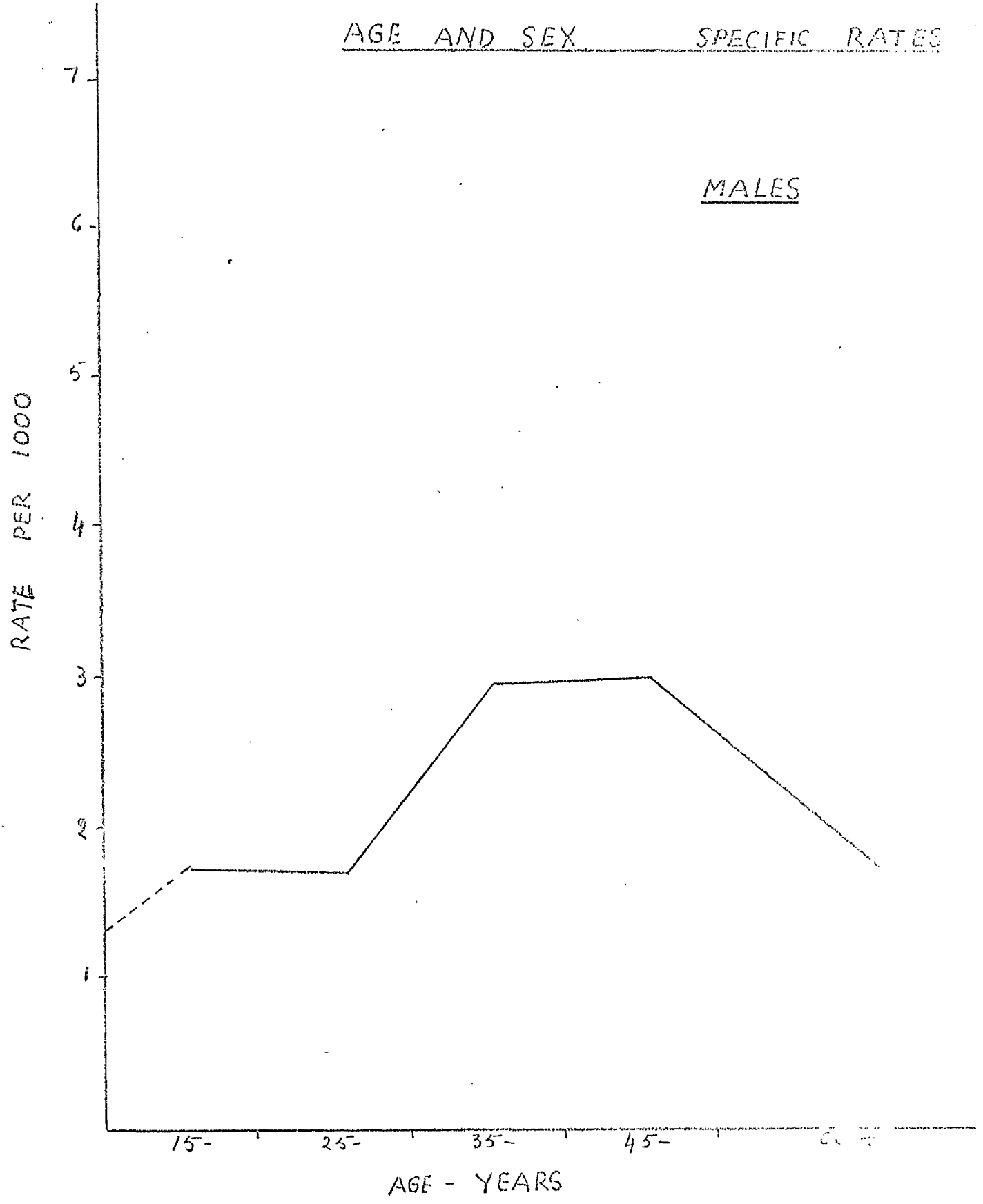


FIG 4 LANARK COUNTY X-RAY CAMPAIGN

ACTIVE RESPIRATORY TUBERCULOSIS

AGE AND SEX SPECIFIC RATES

FEMALES

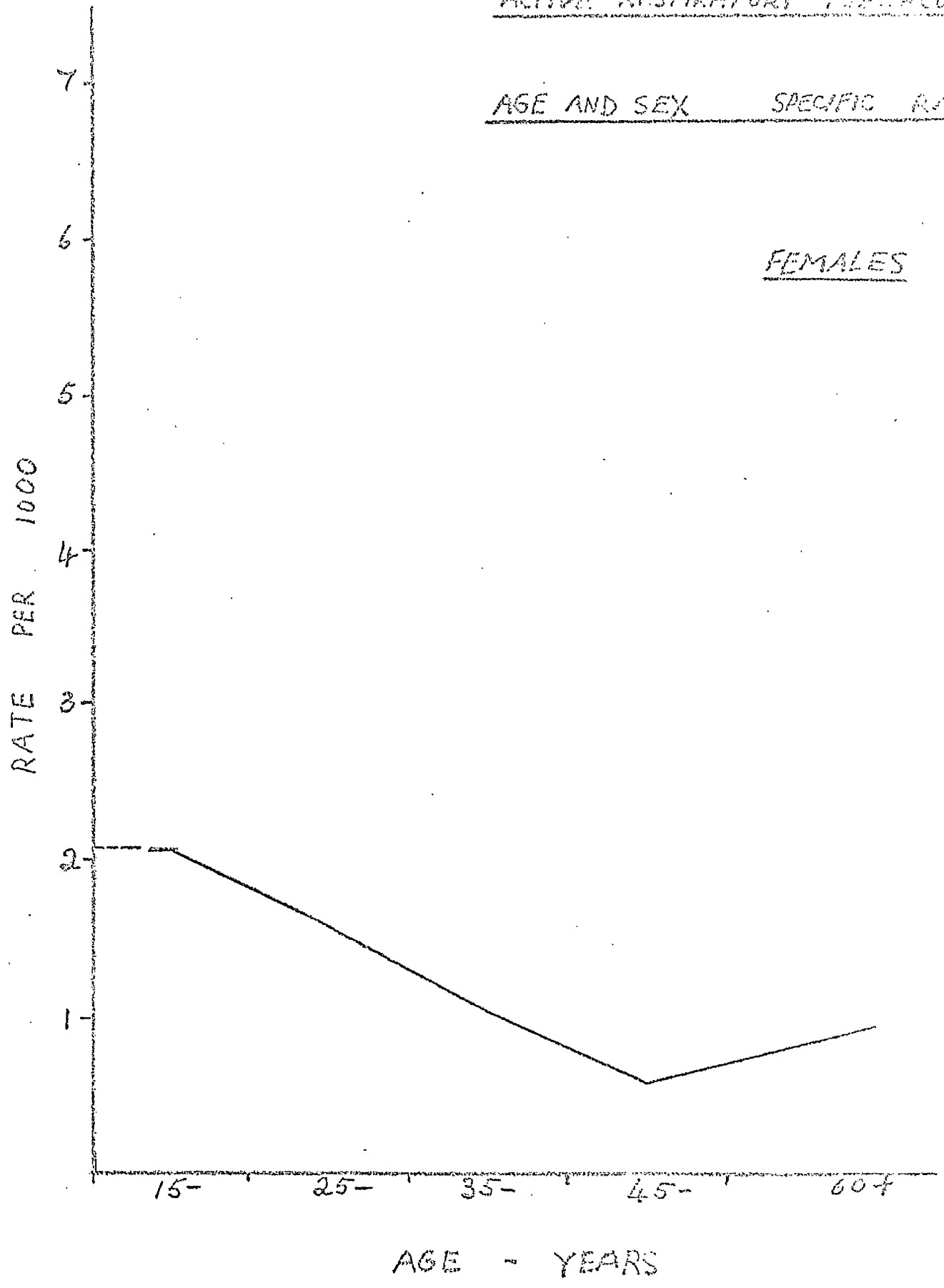


FIG 5 LANARK COUNTY X-RAY CAMPAIGN 1957-[illegible]

RESPIRATORY TUBERCULOSIS REQUIRING OSCILLATION

AGE AND SEX SPECIFIC RATES

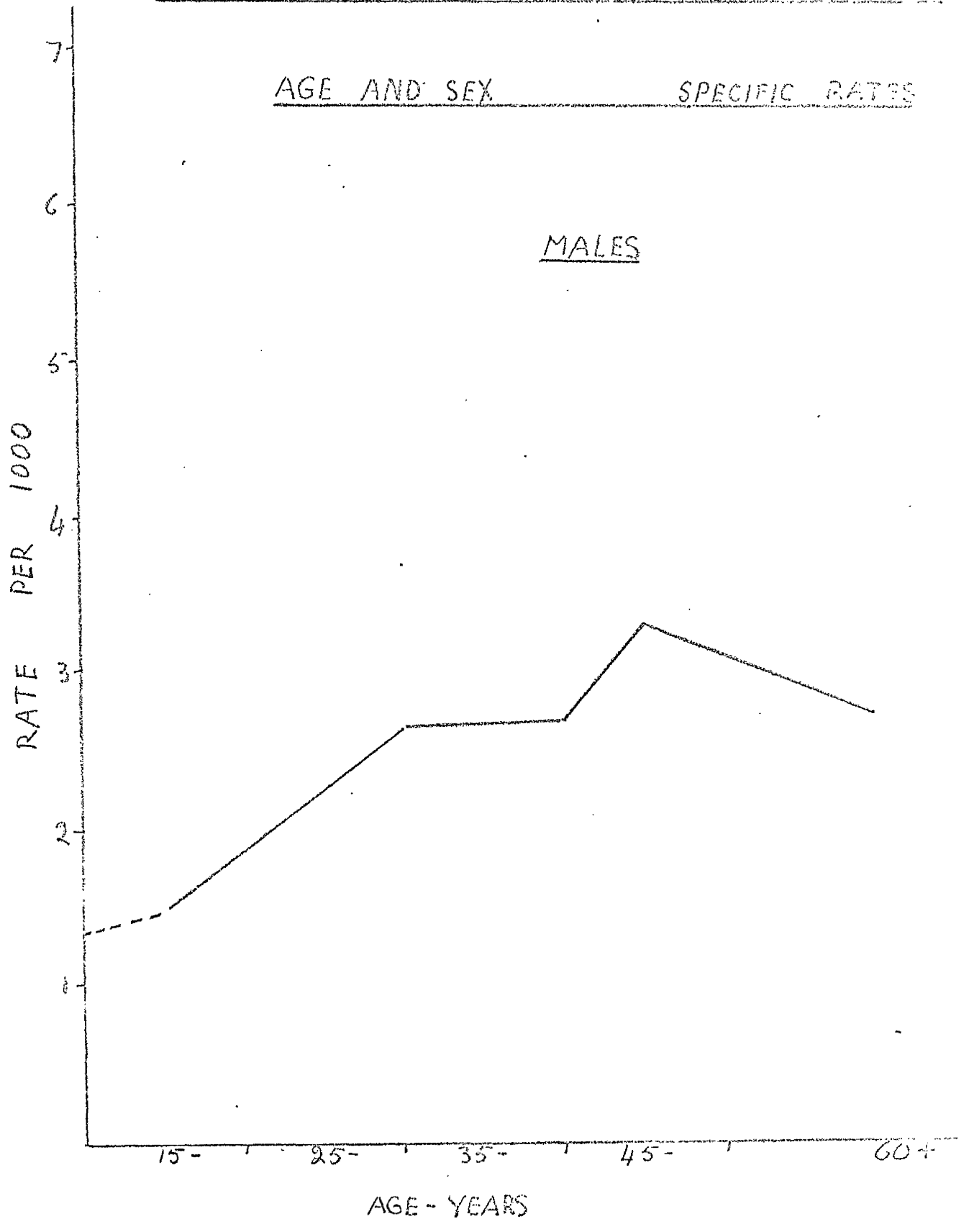


FIG 6 LANARK COUNTY X-RAY CAMPAIGN 1951-52

RESPIRATORY TUBERCULOSIS REQUIRING OBSERVATION

AGE AND SEX SPECIFIC RATES

FEMALES

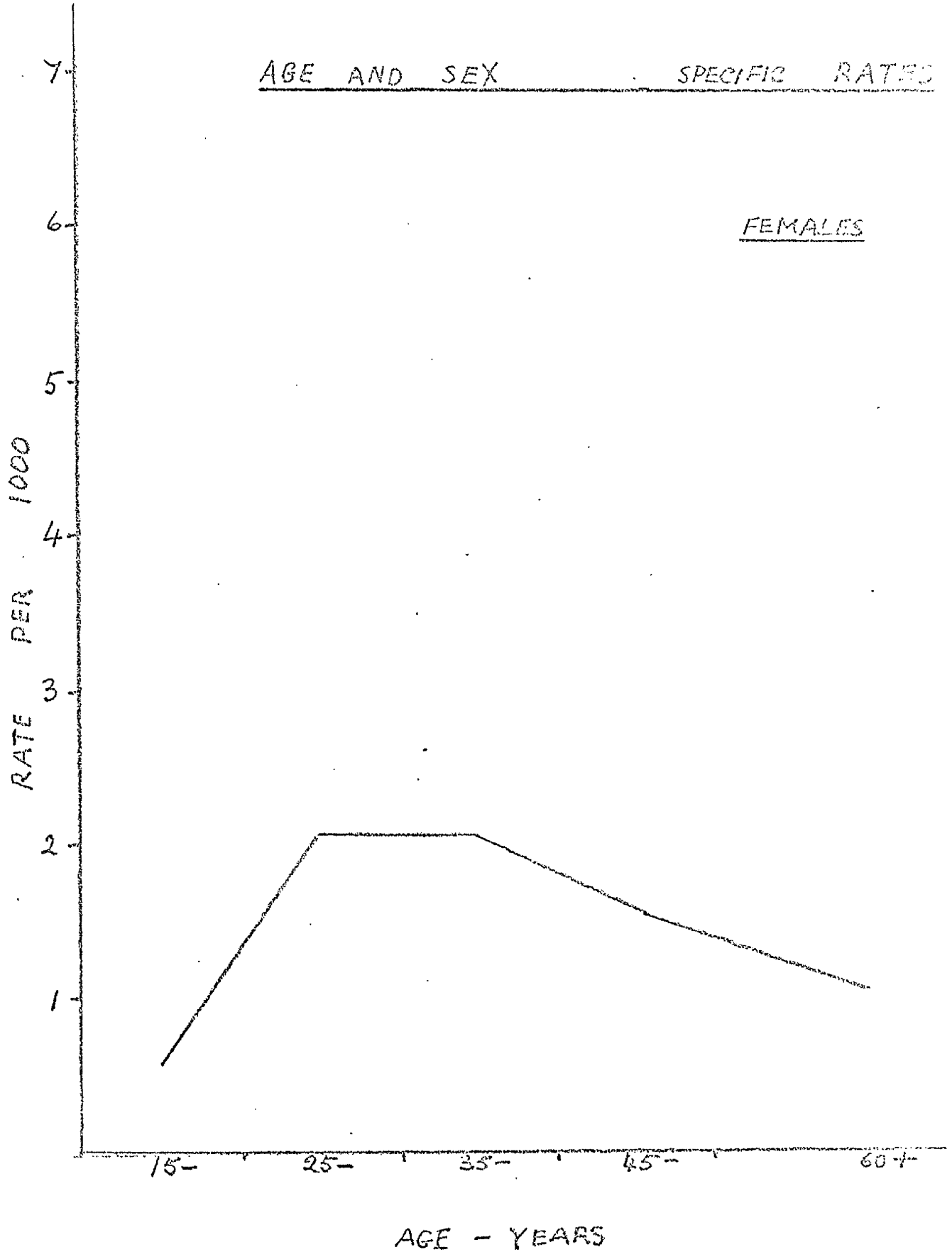


Table XVIII brings out the features already mentioned in tables XVI but it shows rather more clearly that in males for active and observation cases there were two peaks of incidence, one sharp peak in early adolescence and a very much higher peak in middle life; in females, a very sharp rise of active cases in early adolescence and for observation cases a sharp rise in early adult life maintained toward the sixth decade.

Table XVIII also shows in both sexes the very high ratio of active to observation cases in early adolescence.

Figures 3, 4, 5 and 6 show graphically the points already mentioned in tables XVI, XVII, and XVIII.

TABLE XIX

Two-Year Mass Radiography Campaign - Lenark County 1957-1958

Respiratory Tuberculosis

Campaign Results compared with the Notification Rate in the Quinquennium 1952-1956

	Tuberculosis Survey Yield 1957-1958 New Cases among Residents Rate per 1000 examined			Mean Annual Confd. Notifications 1952-1956 Rate per 1000
	Active	Observation	Significant	
Lanark County (Part) 1957	1.59	2.41	4.00	1.39*
Lanark County (Part) 1958	1.42	1.45	2.87	1.39*
Lanark County (1957-1958) Composite Rate	1.5	1.88	3.38	1.39

* Whole County.

In 1957-1958 the Lanark County survey covered a total period of twelve weeks. The number of new cases of tuberculosis discovered was 1.5 per 1000. This compares with a mean annual rate for the period preceding the Campaign of 1.39 per 1000. Thus, more cases of active tuberculosis were discovered by intensive search in less than a quarter of the normal time.

FIG 7

LANARK COUNTY

ACTIVE RESPIRATORY TUBERCULOSIS

CONFIRMED NOTIFICATIONS 1953 - - - - -

1957-58 ——

1962 — — —

MALES

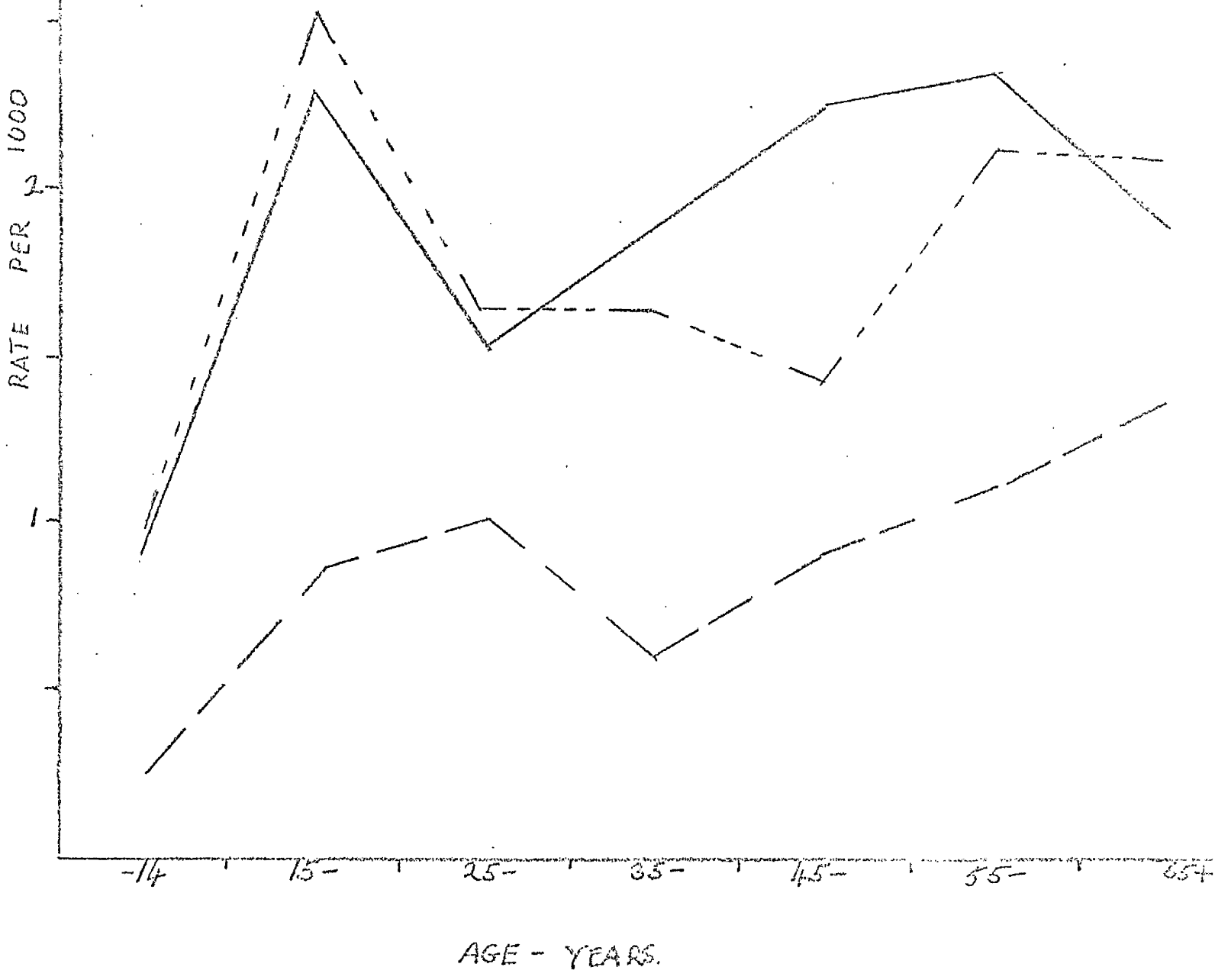


FIG 7A

ACTIVE RESPIRATORY TUBERCULOSIS

CONFIRMED NOTIFICATIONS 1962

LANARK COUNTY — — —

SCOTLAND ————

MALES

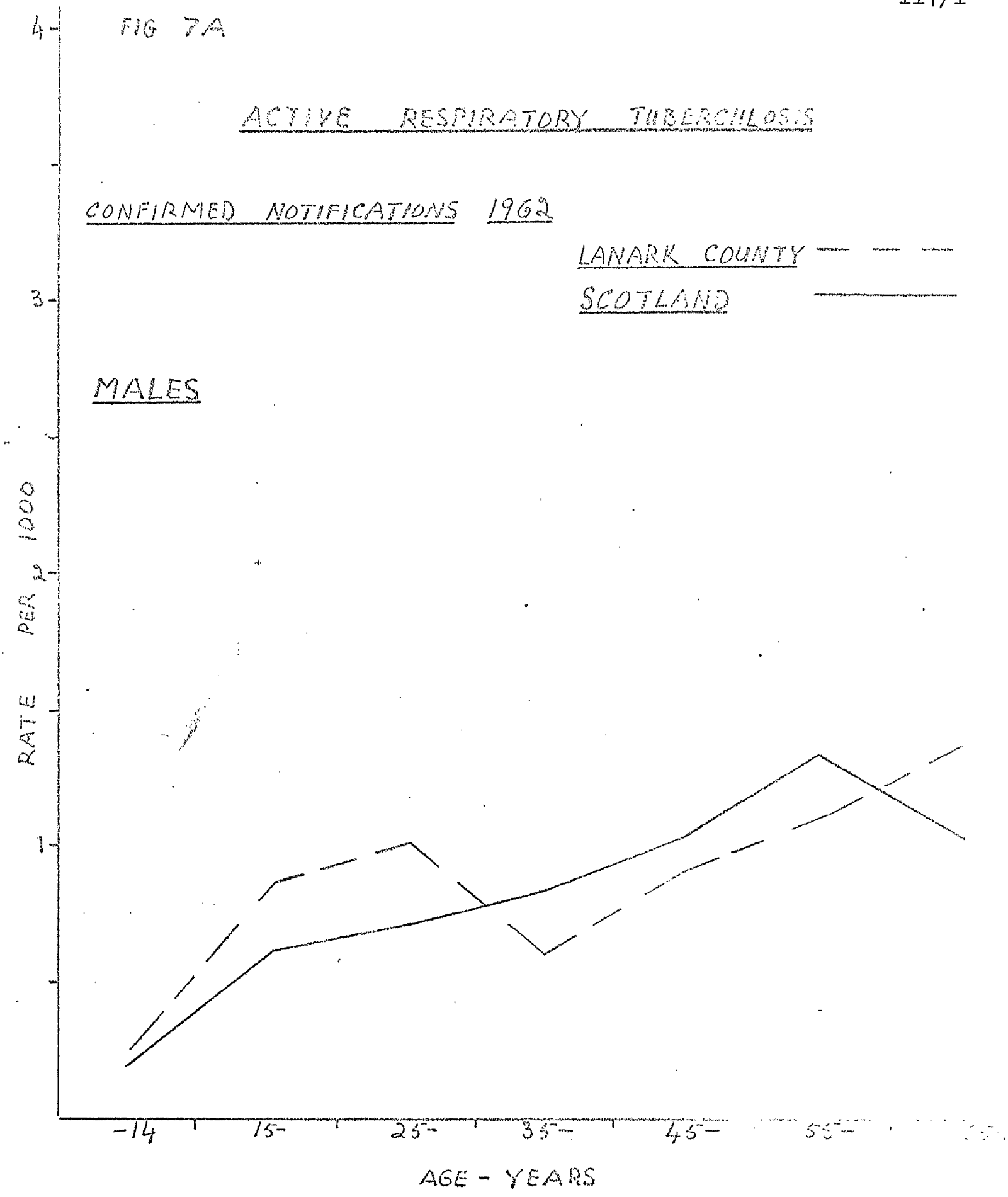


FIG 8 LANARK COUNTY 118/1

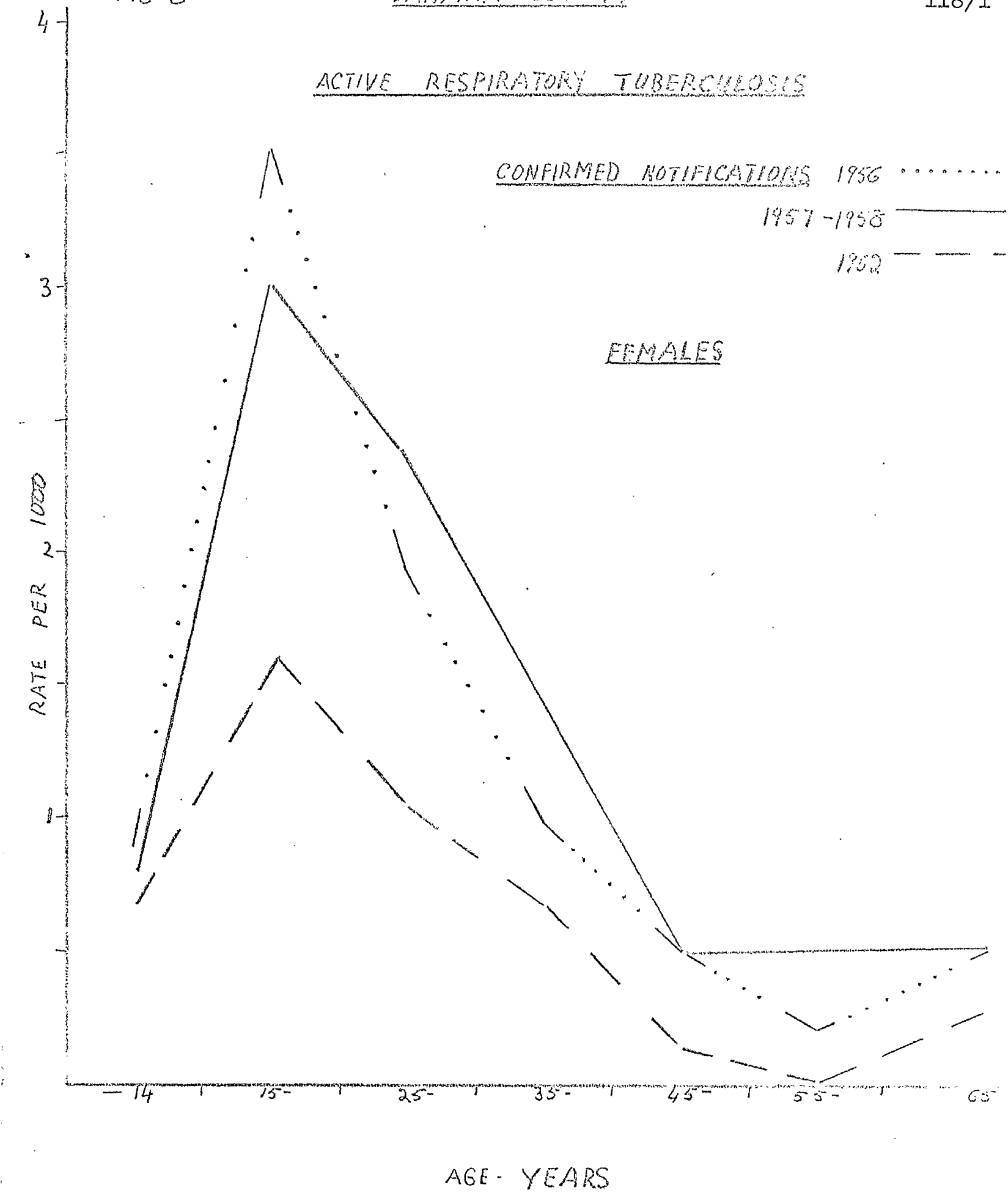


FIG 8A

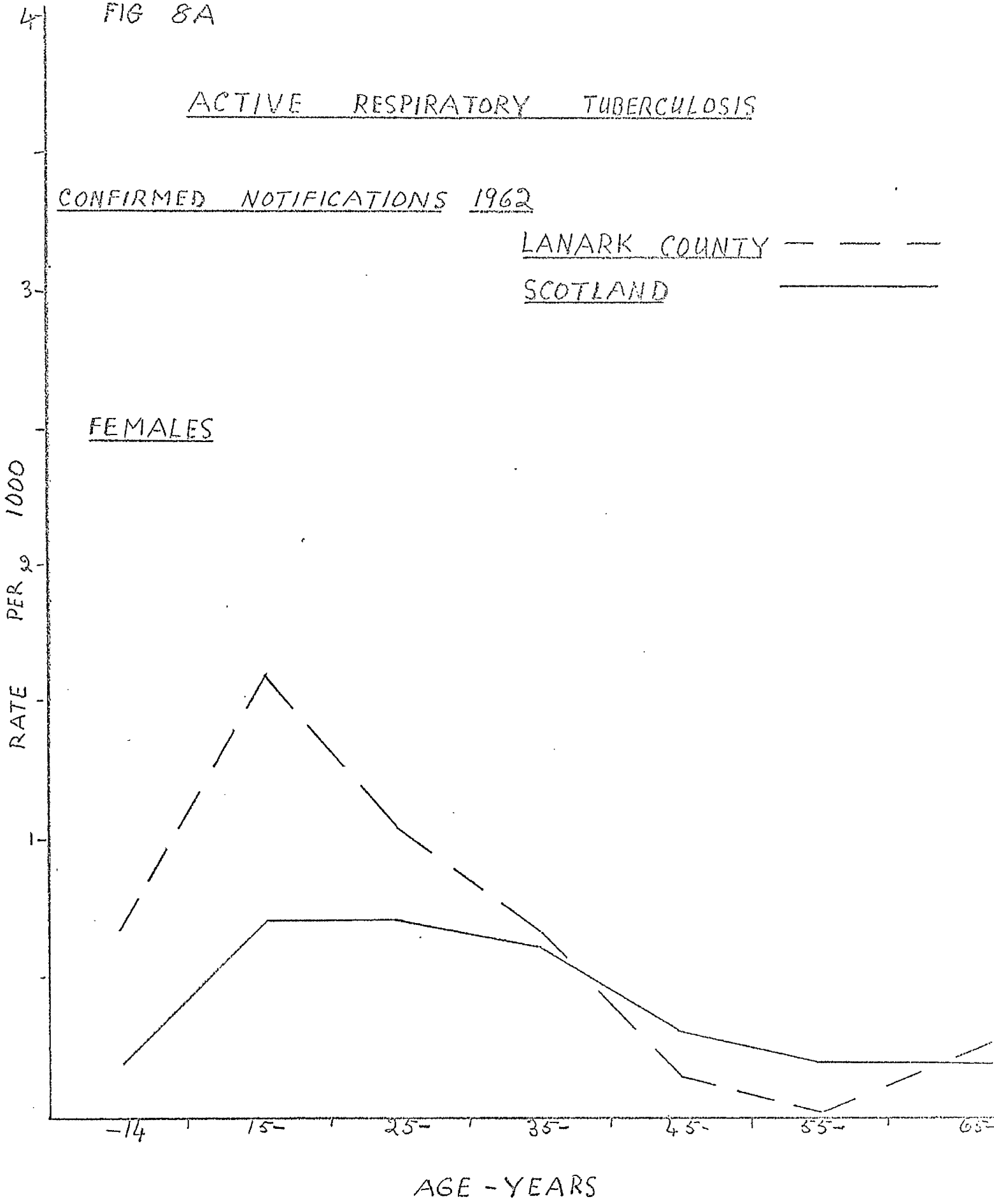
ACTIVE RESPIRATORY TUBERCULOSIS

CONFIRMED NOTIFICATIONS 1962

LANARK COUNTY — — —

SCOTLAND ————

FEMALES



Figures 7 and 8 illustrate the notification rates for active respiratory tuberculosis according to sex and age group for the periods (a) the year preceding the X-ray Campaign, (b) the two years of the X-ray Campaign and (c) four years after the X-ray Campaign.

In males the 1962 figures show an improvement in all age groups over the pre-campaign figures. The pattern of the 1962 graph is broadly the same as that of previous years, namely, an explosive rise in the number of new cases in the middle teens and the highest incidence falling in the sixth and seventh decades.

In females the 1962 figures also show an improvement in all age groups over the pre-campaign figures; the improvement is most evident in the age group traditionally with the highest incidence, namely middle teens to early twenties. At the other end of the scale there is a rising incidence in the sixth and seventh decades. In recent years there have been indications that in females the pattern of age incidence of tuberculosis is becoming more "male".

FIG 9 NUMBER OF PERSONS IN THE COUNTY OF LANCASTER KNOWN TO BE SUFFERING FROM RESPIRATORY TUBERCULOSIS AT THE END OF 1968

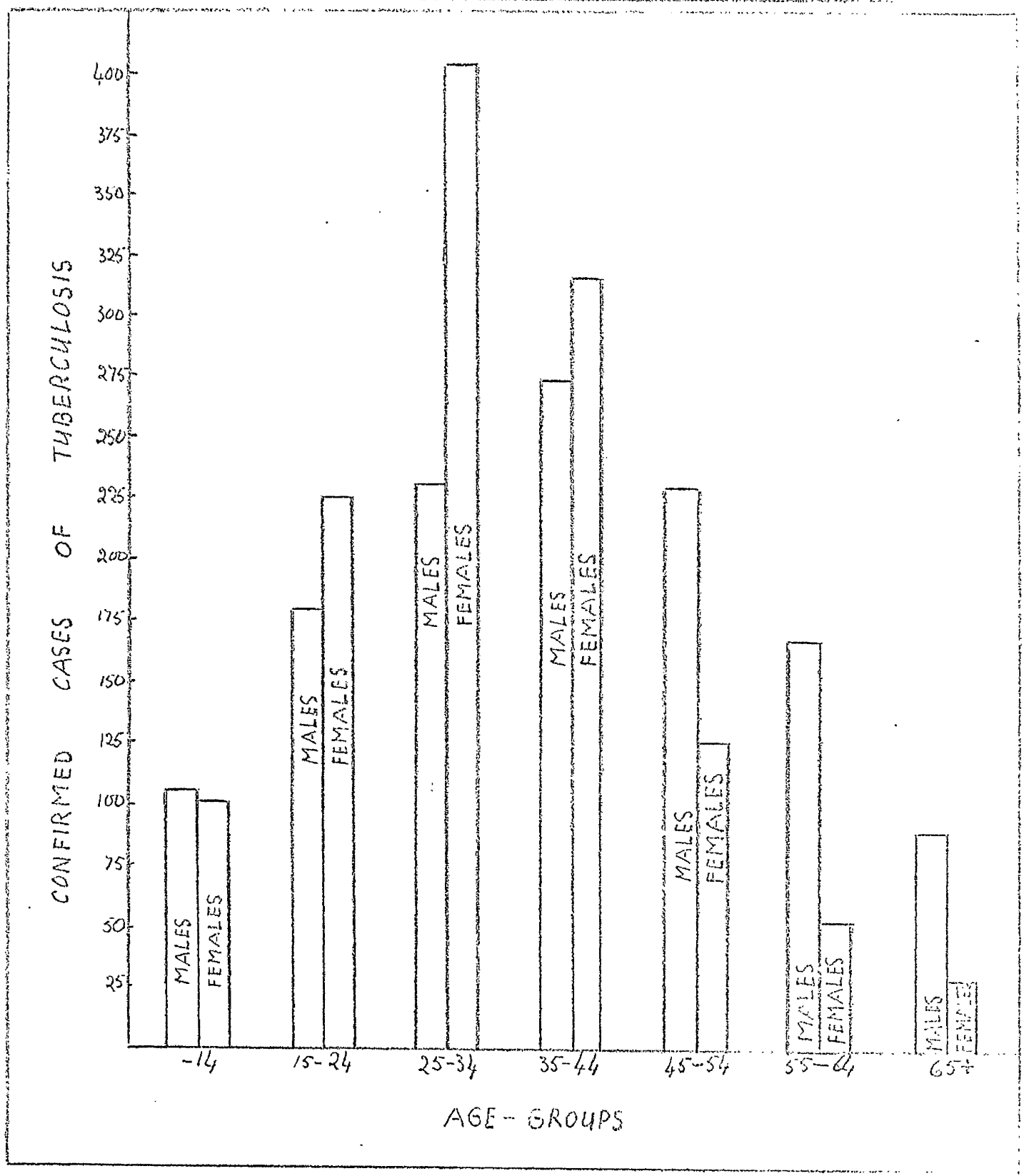


Figure 1 may also be considered at this point with figures 7A and 8A because it brings into perspective progress against tuberculosis in Lanark County against Scotland as a whole. In the period under review 1940 to 1963, Figure 1 demonstrates that, irrespective of sex and age group, the incidence of respiratory tuberculosis in the County of Lanark has been consistently worse than that of Scotland as a whole. We have still considerable leeway to make up.

Figures 7A and 8A show that when the morbidity rate is considered in accordance with sex and age groups, the position of Lanark County in 1962 compares unfavourably with that of Scotland as a whole.

At the close of 1963 there was a total of 2,559 cases of respiratory tuberculosis on the Tuberculosis Register for the County of Lanark. Figure 9 shows the pattern of morbidity according to sex and age groups.

The X-ray Campaign in the County of Lanark 1957-1958

Summary and short appraisal

In the autumn of 1957 over a five week period the first part of Lanark County's mass radiography campaign was held in the areas of the sixth, seventh and ninth District Councils. A total of 48,390 persons were X-rayed. The incidence of respiratory tuberculosis requiring treatment was 1.59 per 1,000 persons examined.

During the mass radiography campaign in Glasgow in the spring of 1957, 52 cases of respiratory tuberculosis had been discovered among persons resident in the County of Lanark. This suggests that some 45,000 persons domiciled in the Country attended the Glasgow X-ray units for examination.

In the autumn of 1958 over a five week period the second stage of the County's mass radiography campaign was held in the areas of the second, third, fourth, fifth and eighth District Councils and in the Burghs of Lanark and Biggar. The expansive but sparsely populated area of the first District Council was surveyed by the "home" X-ray unit during the fortnight preceding the main campaign. 59,761 persons were X-rayed. The incidence of respiratory tuberculosis requiring treatment was 1.42 per 1,000 persons examined. Of the 59,761 persons who reported for X-ray examination, only 597 resided outwith the County.

Taking the two campaigns together, 108,151 persons were X-rayed. In addition, approximately 45,000 Lanark County residents attended the Glasgow Campaign which took place five months earlier than the first part of the County Campaign. It is also estimated that over the two-year campaign in the County only one per cent of the total number X-rayed resided outwith the County. It is of interest that of the 1,844,268 persons X-rayed in the entire/

entire two-year Scottish Campaign 8.1 per cent resided outwith the defined area of survey. The Lanark County response may fairly be described as a native effort. In all just over 150,000 persons resident in the County of Lanark were X-rayed out of a population aged 15 years and upward of about 230,000. Put briefly two thirds of the adult population were examined. This yielded 160 cases of respiratory tuberculosis requiring treatment and 201 requiring observation. This represents an active rate of 1.51 per 1,000 persons examined and an observation rate of 1.93 per 1,000.

On reflection it is considered that the X-ray Campaign in the County of Lanark was a modest success and justified the effort devoted to it. It gave an impetus to the attack on the tuberculosis problem when the time was most opportune. The County is still a black area for tuberculosis and there is still considerable leeway to make up as compared with the tuberculosis problem in Scotland as a whole. But it is contended that the position today would be very much worse had there not been the intensive effort in 1957 and 1958.

The Campaign was a success in a wider sense than that related to an attack on one problem, tuberculosis. It is a fact that progress in the many fields of public health can only be achieved with the active co-operation and participation of people themselves. The X-ray Campaign was essentially an exercise in community endeavour in response to operational planning, intensive publicity and health education, organised team work and the wholehearted support of representatives of the County Council, District Councils, Burghs of Lanark and Biggar and of the army of voluntary helpers totalling some five thousand recruited from the general public and official organisations.

Quite apart from its primary objective, a major blow at tuberculosis, the Campaign demonstrated that success in a major venture of this kind is not the prorogative/

prerogative of large urban areas where there is a concentration of population and an adequacy of technical resources but that rewarding results can be achieved in an extensive region, partly industrial, partly rural, of widely dispersed communities. Such a populace when given the necessary information on the aims of a major health project and inspired with a sense of common purpose can accomplish great things in the cause of preventive medicine and the general public good.

Miniature Film Radiography in the Future

As a preventive and diagnostic measure miniature film radiography is concerned with the detection of actual or potential infectious pulmonary tuberculosis. Its role in the early discovery of lung cancer will be considered later.

The ideal would probably be chest X-ray examinations at regular intervals of all members of the community from the middle teens onwards. Having regard to the somatic and genetic hazards of radiation it would need to be carefully determined what these intervals should be. A balance would need to be struck between the advantages of periodic chest X-ray examination and the long term effects of repeated exposure to X-rays. However, as it is most unlikely that there would be a sufficient measure of public interest and co-operation in any scheme of regular chest radiographic examination, we must be content with something more practicable. This is the deployment of miniature film radiography on a selective basis. Population groups to which attention might be directed are as follows:

A. High Incidence Groups

1. Symptom group referred by general practitioners.
2. Contacts of known cases.
3. Contacts of tuberculin positive school children.
4. Hospital in-patients and out-patients.
5. Inmates of common lodging houses.
6. Inmates of prisons.
7. Immigrants.
8. Factory personnel and Workers in various industries e.g. mining, quarrying, foundry work and laundering.
9. Those whose age and sex determine a hazard.
10. Expectant and nursing mothers.

B. "Danger" or High Risk Groups

1. Teachers at day schools, colleges and further education evening classes.

2. Medical and Dental Practitioners.

3. Health visitors, District Nurses, Midwives, Nursery Nurses, Social "field" workers and Domestic Helps.

4. Hospital employees.

5. Food handlers, Bar Attendants and Canteen workers.

6. Shop assistants.

7. Hairdressers.

8. Ticket collectors in public transport.

9. Cinema and Public Hall usherettes.

A. High Incidence Groups

1. Symptom group referred by general practitioners.

In this class the incidence of respiratory tuberculosis is always considerably in excess of that in the general population. Heaseman (1961) gives the following figures for this group; males, 11.8 per 1,000; females, 7.6 per 1,000. The highest morbidity rate is in males between 55 and 60 years (14.9 per 1,000), and the lowest morbidity rate is in females in the same age group 55-60 years (3.4 per 1,000). In Glasgow in 1960 17 per 1,000 cases of active disease were discovered among 7,000 patients referred to the Mass Radiography Centre by their family doctors (Godden and Hawthorne, 1961).

2. Contacts of known cases. Heaseman (1961) gives the following statistics for this class: males, 2.6 per 1,000 examinees; females, 2.9 per 1,000 examinees. The highest morbidity is in females between 25 and 35 years (5.3 per 1,000) and the second highest morbidity in males 65 years and over (4.6 per 1,000).

That/

That contact examination is worth all the labour it entails has been demonstrated by Tyrrell and Smith (1956) in Glasgow. In a series of 125 cases from a population of 250,000 they were able to demonstrate definite contact history in 77.6 per cent of the male and 75.4 per cent of the female cases.

R.H. Andrews et al. (1960) found an incidence of 4.2 per cent infectious tuberculosis among family contacts of index cases. Loudon, Williamson and Johnson (1958) found an incidence of 4.5 per cent "significant respiratory tuberculosis" in household contacts in Edinburgh.

The value of extending the field of contact investigation to the fellow employees of the index case is perhaps not as vigourously pursued as it might be. Admittedly the art of diplomacy must be of a high order in any approach to the employer and through him to the employees. The consent of the patient is usually forthcoming before such an approach is made but it is equally important to avoid as far as possible prejudicing the patient's status with management and work mates alike.

3. Contacts of tuberculin positive school children. In respect of school entrants at 5 years who are found to be tuberculin positive, the weight of evidence points to infection in the home among close relatives for the source case. Geddes and Hawthorne (1961) reported a rate of 10.8 per 1,000 of active pulmonary tuberculosis among household contacts of tuberculin positive school children in a survey of 1,000 children, 500 aged 5 years and 500 aged 9 years.

It is generally agreed that there is a need to make tuberculin testing an integral part of all routine school medical examinations. If such a scheme were adopted positive reactors would be X-rayed on Odelca if not on large film and whether an active primary focus were discovered or not investigation would include household contacts and school teaching staff. Further comment on this subject is made under the heading "Tuberculin Testing".

4. Hospital in-patients and out-patients. Chest radiography of patients in these groups is not routine practice in this country. Heaseman (1961) gives the following figures for cases of active respiratory tuberculosis: males, 2.3 per 1,000, the highest morbidity rate (4.5 per 1,000) occurring at age 55 years and over; females, 1.4 per 1,000, the highest morbidity rate (1.9 per 1,000) occurring between 20 and 25 years.

The association of miniature radiography with a general hospital which occupies a strategic position in the community encourages general practitioners to refer their patients to the miniature film unit. This in turn relieves the number of unnecessary referrals to the overloaded consultation clinics and at the same time expedites the investigation and treatment of patients referred in the first instance only for chest X-ray.

At two of the hospitals in Lanarkshire there are facilities for miniature film radiography. Each unit is a 70 m.m. Odelca camera housed in the chest clinic which is part of a general out-patient department serving a large area of urban and rural population. The family doctor has always been a fruitful source of new cases of pulmonary tuberculosis. To have at his disposal a chest X-ray unit easily accessible to his patients and able to give quick reports has been found to be of inestimable value not only in the early recognition of tuberculosis but of lung cancer and cardiac enlargement.

Whether patients who are admitted to hospital or attend out-patient departments should have chest X-ray examination as a routine is a very debatable question. A point that may be said in favour of it is that medical, nursing, administrative and ancillary staff of the hospital would be protected from tuberculosis infection in patients whose condition was infective and unsuspected.

In a classic study R.G. Ferguson (1955) showed that the incidence of tuberculosis/

tuberculosis among hospital nurses negative to tuberculin was 4 or 5 times that of nurses positive to tuberculin assuming both groups entered the hospital service at the same time. The incidence of tuberculosis in the former group only declined when they were given B.C.G. on entry. While this is a good argument for B.C.G., nevertheless it reflects the degree of risk to which hospital nurses are exposed. The morbidity rate of respiratory tuberculosis in mental hospital nurses in Lanarkshire, taking an average over the past eight years, is for active disease 4 per 1,000 examinees, and for disease requiring observation 16 per 1,000. In 1962 the incidence of active respiratory tuberculosis among mental hospital patients in Lanarkshire was 3.6 per 1,000.

5. Inmates of common lodging houses. Recent surveys of inmates of lodging houses as well as of unofficial and unlicensed reception centres have shown a very high incidence of active pulmonary tuberculosis. Geddes and Hawthorne (1961) quote an incidence of undetected active disease of 100 per 1,000 among vagrants in Glasgow most of whom stay for some time in the City's lodging houses. During 1960 a survey was carried out in two common lodging houses in Lanarkshire. 224 inmates volunteered for chest X-ray examination. The morbidity rate worked out at 8.9 per 1,000 for active pulmonary tuberculosis and 13.3 per 1,000 for tuberculosis requiring observation. The X-ray unit was taken to the front door of the lodging house and operated for two hours in the evening when it was assumed that most of the men had returned "home". No inducements to X-ray were offered and the response was about 60 per cent.

Who are the men who go to lodging houses and reception centres? The Registrar-General puts them in Social Class V. They are a motley group but for the most part, the unemployed and the unemployable, men from broken homes, men who have run foul of the law, and some who are immigrants who have never found work./

work. In medical categories they are often people with mental or physical handicap, chronic alcoholics, enuretics, schizophrenics, psychopaths and senile dements.

6. Inmates of prisons. Tuberculous persons under detention may be a source of danger in our overcrowded custodial institutions. They do not usually volunteer information on their health to the medical authorities when received into custody. Chest X-ray examination of all prisoners on admission should be as much a routine as finger-printing.

Heaseman (1961) gives the following figures for active pulmonary tuberculosis in this class: males, 7.5 per 1,000 examinees, the highest morbidity rate, namely 39.6 per 1,000, being in the age group 60 years and over; females, 1.4 per 1,000 examinees, the highest morbidity, namely 4.3 per 1,000, occurring in the age group 35 to 45 years. Geddes and Hawthorne (1961) report an incidence of 10 per 1,000 examinees in respect of active undetected pulmonary tuberculosis.

7. Immigrants. Chest radiographic examination of immigrants is a subject which has been debated endlessly.

In a survey of just over 500 Pakistanis living in Glasgow Geddes and Hawthorne (1961) reported an incidence of active pulmonary tuberculosis of 21 per 1,000 examinees. This figure takes on an added significance when, as the authors remind us, there are some 3,000 Pakistanis in Glasgow and they arrive in the city at the rate of about a dozen per day.

8. Factory personnel and Workers in various industries. Important groups who need radiographic check are:

(a) New entrants to industry.

(b) All employees reporting back to work after illness with symptoms directly or indirectly referable to the lungs. (Assuming the family doctor has not already/

already arranged a chest X-ray).

(c) All workers exposed to a lung hazard arising out of their occupation such as mining, quarrying and the steel industry.

The whole subject of tuberculosis in industrial and factory workers is a vast one and only one or two points of immediate interest will be touched on.

Among workers in industry it is especially important to detect chest disease as early as possible. The association between tuberculosis on the one hand and pulmonary massive fibrosis and silicosis on the other has long been recognised.

Many industrial firms have their own chest X-ray plant and the National Coal Board has its own mobile X-ray units. In 1944 Lanarkshire became one of the first areas in Scotland to be assigned a mobile X-ray unit. Over the years special attention has always been directed to factories and industries and some indication of the work of the Unit in this respect is given in tables IV, V and VI.

The investigations of the Pneumoconiosis Research Unit has shown the importance of the smaller dust particles (of less than 2 to 5 microns) in initiating pulmonary infection. The tubercle bacillus is of the order of 2 microns. As most sputum droplets are much larger than this and are effectively scrubbed out in the upper respiratory passages, the inference is that pulmonary tuberculous infection may be initiated by a single virulent organism. This would explain why overcrowding whether it be in the home or in the work environment is such an important factor in the spread of tuberculosis.

Reference to Table IV shows the morbidity from pulmonary tuberculosis in factory groups in Lanarkshire. Heaseman (1961) gives the following figures for England and Wales during the period 1955-1957: males, 1.4 per 1,000 examinees, the age group with the highest morbidity (1.9 per 1,000) being 55 to 60 years; females,/

females, 1.3 per 1,000 examinees, the highest morbidity (1.7 per 1,000) occurring in the age group 20 to 25 years.

9. Those whose age and sex determine a hazard. The incidence of pulmonary tuberculosis according to age and sex found in the Lanark County Campaign of 1957-1958 has already been discussed in this paper. The incidence found in surveys carried out by the Lanarkshire Mass Radiography Unit is presented in Tables III and V. The distribution of annual notifications according to age and sex in Lanark County is given in Tables VII and VIII.

In the County of Lanark in 1961 there were 71 persons classified as suffering from chronic infectious respiratory tuberculosis. The majority of these patients had tubercle bacilli in the sputum and were resistant in more or less degree to the tuberculostatic drugs. The significant point is that male patients outnumbered female in the ratio of 2 to 1, and by a wide margin the highest single incidence occurred in men between 55 and 64 years of age.

The elderly have always been a very elusive group for radiography, and tend to be uneo-operative in treatment. Men in the 5th and 6th decades have the highest incidence of sputum positivity. These cases are a particular danger because they are invariably free from symptoms until their condition is advanced. Pre-employment chest X-ray examination for everyone is never likely to be compulsory but there should at any rate be more uniform practice of radiographic examination for those over 45 years seeking employment which will involve close association with children.

The other age group with a high incidence of respiratory tuberculosis is the adolescent and young adult and more especially females. This trend can be discerned to some extent in Tables III, V, VII and VIII. In surveys carried out in the Lanarkshire area in 1961 it was found that active pulmonary tuberculosis/

tuberculosis occurred in females between 15 and 34 years at the rate of 3.31 per 1,000.

When these two age groups are considered together it would appear that age in itself confers additional susceptibility in males and additional resistance in females. Tuberculosis is today a disease of old men and young women. Why this should be so is a question on which many theories have been expounded. The mechanism of endogenous exacerbation is puzzling. A deviation in the physical or emotional equilibrium may convert the most trivial and innocent lesion into an acute spread. Sometimes the causes of the development of the reinfection type of lesion are more obvious. The interplay of poverty, bad housing and malnutrition in persons previously infected is well established. The effect of psychological factors is more abstruse. That there is a subtle relationship between tuberculosis toxaemia and the emotions has long been recognised. The literature of the nineteenth century contains countless references to it. Love and phthisis have had an unstable courtship from the earliest times.

10. Expectant and Nursing Mothers. In 1961 the Thoracic and Cardiac Panel of the Adrian Committee reported that out of every 1,000 expectant mothers who had chest X-ray examination one could expect to find 2 hitherto unknown and unsuspected cases of significant pulmonary tuberculosis. The Panel recommended that routine chest X-ray examination be carried out in all expectant mothers. It was further advised that this examination be carried out before the 24th week of pregnancy and on full size film.

In 1961 when the Adrian Committee made their report and recommendations, the incidence of pulmonary tuberculosis in the County of Lanark for the population in general was at the rate of just under 1 per 1,000, and the rate for

nulliparous/

multiparous women of reproductive years was at the rate of 1.4 per 1,000.

During the year 1962, 2,881 expectant mothers attending ante-natal clinics in the County of Lanark were referred for chest radiography. 6 new cases of active pulmonary tuberculosis were disclosed and 28 further cases required observation. 10 mothers attended for chest X-ray examination during the post-natal period and 1 required further observation. Thus the incidence of pulmonary tuberculosis in expectant mothers works out at just over 2 per 1,000, the expected figure of the Adrian Committee.

Clearly, expectant mothers are a group predisposed to tuberculosis infection and special attention must be directed to them.

D. <u>"Danger" or High Risk Groups</u>

This group consists of those who may be harbouring tubercle bacilli in their lungs and who by the nature of their occupation come into frequent and close contact with others.

1. Teachers at day schools, colleges and further education evening classes. Most local authorities now run a voluntary scheme for the annual chest X-ray examination of teachers who receive under the scheme an extended period of full pay if they have to stop teaching because of tuberculosis. As these schemes are voluntary co-operation from the entire teaching staff of an education authority is seldom complete.

In respect of the small percentage of teachers who refuse periodic chest X-ray examination, it is unfortunate that the majority are in the very age group which in males especially consistently reveals a high percentage of tuberculosis. The writer feels that if the X-ray examinations were carried out at longer intervals than at present - say every 3 years - the non-acceptance rate would probably disappear, and that the extended interval between chest X-ray examinations/

examinations would be a small price to pay for co-operation from the whole body of teachers.

Heaseman (1961) gives the following figures for active respiratory tuberculosis in this group: males, 1.11 per 1,000; females, 1.23 per 1,000. During the period 1958-1960, inclusive of both sexes, the figure for teachers of Lanarkshire Education Authority was 1.03 per 1,000. This figure was certainly below the average for all M.M.R. examinee groups (1.28 per 1,000) in Lanarkshire over a comparable period but it does not truly reflect the danger to children that exists from teachers with open pulmonary tuberculosis.

2. Medical and Dental practitioners. This is a very elusive group for chest radiography. No figures seem to be available for doctors and dentists as a class. The vital importance of regular check up on ourselves needs no stressing.

3. Health visitors, District Nurses, Midwives, Nursery Nurses, Social "field" workers and Domestic Helps. Under most local authority arrangements, members of these groups are regularly X-rayed, and in this matter have the highest sense of responsibility for their own health and the community they serve.

4. Hospital employees. In most hospitals the nursing staff are under careful and regular supervision. This together with B.C.G. vaccination of trainee nurses has greatly reduced the incidence of all forms of tuberculosis in the hospital nursing service.

Heaseman (1961) gives the morbidity rate for nurses in general for respiratory tuberculosis as 0.96 per 1,000. This morbidity rate is well below that for general public volunteers (2.2 per 1,000) and for all pre-formed groups (2.1 per 1,000) at mass radiography sessions.

In routine radiography other hospital staff should not be forgotten; this includes/

includes doctors, laboratory technicians, domestic workers and dining room attendants.

5. Food handlers, Bar attendants, and Canteen workers. The only workers in the above comprehensive groups who are X-rayed on a routine bases are kitchen staff in school canteens. Greater effort should be made to include kitchen staff and dining room attendants in hotels, canteens, restaurants and trains; this includes counters where drink is served; and let us not forget the "wee pub at the corner".

Geddes and Hawthorne (1961) found an incidence of 9.9 cases of active pulmonary tuberculosis per 1,000 examinees among catering apprentices. Heaseman (1961) gives these morbidity rates for respiratory tuberculosis: kitchen hands (males and females) 2.1 per 1,000; bar attendants (males only) 5.6 per 1,000 examinees.

6. Shop assistants. This is a difficult group to X-ray on a large scale. A great deal depends on a diplomatic approach to the manager and on the manager himself showing a lead. In the County of Lanark our experience is that on the whole co-operation from managements and staffs has been good whenever an actual case of tuberculosis is discovered in a member of a staff; but when it is simply a case of inviting personnel to attend the M.M.R. Unit, the response is disappointing. The morbidity rate for respiratory tuberculosis in this group is given as: males, 2.97 per 1,000 examinees; females 2.06 per 1,000 (Heaseman 1961).

7. Hairdressers. They are not an easy group to bring within a selective radiography scheme but are clearly a great potential danger in the spread of respiratory tuberculosis. The morbidity rate for this group has been assessed at 1.97 per 1,000 examinees.

8./

8. Ticket collectors in public transport. The incidence of pulmonary tuberculosis is high in this class: males, 4.73 per 1,000 examinees; females, 5.7 per 1,000 (Heaseman 1961). In an examination of 2,000 employees of Glasgow Corporation Transport Department (not exclusively collectors) Geddes and Hawthorne (1961) found active rates of 8 and 12 per 1,000 among white and coloured employees respectively.

For all workers in this group chest X-ray examination should be a condition of employment with periodic re-X-ray. With the larger public transport companies a group radiography session should not be difficult to hold.

9. Cinema and Public hall usherettes. Not a large group but important enough. An attendant coughing up tubercle bacilli in a crowded cinema or hall could infect many people.

General Conclusion

The final stage in the eradication of tuberculosis will demand a more intensive epidemiological approach on the part of the medical officer of health. One way in which this approach may operate is as follows. A general picture of tuberculosis prevalence is first obtained within the area of the health authority When this is done it is invariably found that certain areas or districts are much more affected than others. It is then ascertained what are the factors involved in the causation of a high prevalence in these communities. Pursuing investigation there are found "pockets" - it may be streets or tenement blocks - which harbour tuberculosis. When enquiry reaches the stage of tracking down individual patients the clinician takes over the management of each case but the epidemiologist must continue his investigation into family circumstances whic may have caused or at least precipitated disease in an individual member.

These local "black spots" should have full scale radiographic survey and an intensive and detailed effort is required over a period of time similar to the surveys carried out in Annandale and in the Vale of Glamorgan.

Selective radiography both on an area and on a group basis will overcome the defects of the large community surveys by concentrating on the hard core of non-co-operators, reducing the number of defaulters, and by permitting a more personal approach.

Selective radiography will, however, make the large mobile units cumbersome and uneconomical. What is required is a small compact mobile unit operated by a team of three - radiographer, clerkess and driver - technician. Such a unit would also take large films in the case of young children and expectant mothers. This type of unit would visit small communities to X-ray the groups already mentioned and help clear up local "black spots".

One/

One sometimes hears the view expressed that because of the effectiveness of chemotherapy it is no longer a matter of life and death to find tuberculosis in the early stages, and that even in advanced disease satisfactory results can be obtained by chemotherapy alone. This view together with the rapidly dwindling yield from surveys has led many to denigrate mass radiography and to question whether it is really worth the effort not only financially but in terms of medical and administrative man-power to discover a case of tuberculosis only somewhat earlier that would be possible by other methods. The short answer is that while the individual sufferer may not gain much by earlier diagnosis the community will be spared needless exposure to infection. Early diagnosis is in fact prevention. The cost of detecting the chronic advanced infectious case of tuberculosis cannot be criticised on any economic grounds. As a danger to public health he is of supreme importance.

Apart from the eradication of tuberculosis it is worth speculating on another role that mass radiography might play in the years ahead. If dramatic advances were to be made in the treatment of lung cancer this would probably accentuate the need for early detection. The mass radiography service might be called upon to accomplish for that disease what it has already done in the field of tuberculosis. The discovery of potent drugs against the tubercle bacillus was the great opportunity of mass radiography. It may be that it will prove of even greater service to humanity when an effective chemotherapeutic agent is found for malignant lung disease.

The Tuberculin Test in Case-finding

Tuberculin testing is linked with miniature radiography. The views expressed in this part of the paper concern the place of tuberculin testing in the control and eradication of tuberculosis.

Paradoxically, the tuberculin test becomes more important as tuberculosis becomes less prevalent. This is on account of three factors. First, mass X-ray surveys of the kind conducted in Scotland in 1957-1958 have come to be less efficient in case finding and more uneconomical as the tuberculosis case rate diminishes. In the face of a declining incidence any generalised detection method becomes economically unsound. With the present incidence of pulmonary tuberculosis of less than 1 per 1,000 for the population in general the law of diminishing returns operates. Second, the efficiency of the tuberculin test as a case finding procedure increases as the general level of tuberculin sensitivity decreases. Third, the public are now very alert to minimise any potential hazard from X-rays.

A proper evaluation of any tuberculosis case finding method must be based on certain fundamentals which include ease of performance, cost, deployment of medical and administrative man-power and number of active cases found. As regards the first three criteria, mass X-ray surveys compare unfavourably with tuberculin testing; as regards the number of active cases found, the respective merits of mass surveys and tuberculin testingare not in question but simply how the two methods can be combined effectively to make case-finding at the present time an economical proposition.

The school population is an ideal preformed group for the practical application of combining miniature radiography with tuberculin testing. The technique of tuberculin testing with the Heaf apparatus would not add more than half/

half a minute to the examination of each child. If necessary the reading of all tests could be done by one observer. The little additional time and work spent on tuberculin testing children of the age groups presented for routine medical inspection would be well rewarded not only in terms of tuberculosis control but also as a research project to throw light on some of the unsolved mysteries of tuberculosis infection, such as, the relation between allergy and immunity, infection and disease, primary infection and reinfection.

If the practice of routine tuberculin testing of school children were adopted there would be less anxiety in health departments and less scurry for action, whenever an infectious case occurs in a school, to tuberculin test a class, or even a whole school, and to X-ray the teaching staff to ascertain whence infection has come and where it has been passed on.

A register of child reactors should be kept and those on it reviewed at regular intervals by further tuberculin testing to detect increased sensitivity and, if indicated, by chest radiography to detect signs of active disease.

Not a great deal of investigation has been done on the significance of varying degrees of tuberculin sensitivity but in one of the most recent and comprehensive investigations undertaken by the British Medical Research Council into the efficacy of B.C.G. and Vole Vaccines (1956, 1959 and 1963) it was found that the incidence of tuberculosis in those initially positive to only 3 T.U. was 2.5 times greater than those initially positive to 100 T.U.

As many experts have suggested there possibly are a multitude of nuances of sensitivity between the most delicate allergy and total anergy. On the value of the tuberculin test Krause says "So multiform and far reaching are its implications that it is my own opinion that with Laennec's promulgation of the unity of phthisis, Villemin's discovery of the infectiousness of tubercle, and Koch's/

Koch's revelation of the bacillus, it makes up the quartet of really great episodes in the history of tuberculosis" (quoted by McDougall 1949).

In 1950 Dr. Tobias Godde-Dahl commented "During the fight for the final eradication of tuberculosis in Norway the disease has passed through various phases. During the epidemic phase society was heavily exposed to free tubercle bacilli which infected and super infected all age groups. Even in children the infection rate was very high, most of them reaching adult life tuberculin positive. Except in small children and in certain rural regions the diagnostic value of the tuberculin test was very small.

We are now passing into an endemic phase during which the infection survives mainly in the bodies of tuberculin positive people. The diagnostic value of the tuberculin test will be very high although there will be few converters. Endemic infection will take a long time to eradicate but serious disease and death can be prevented by adequate control of the positive reactors. If this is done the steadily increasing negative population is protected. The use of B.C.G. vaccine for negative reactors would not then be advisable particularly as it would render ineffectual the tuberculin test as a means of identifying infected persons. There would not be much argument against this were it not for the fact that there is an intermediary stage between the two phases, the endo-epidemic phase during which the tuberculin positive cases constitute an open threat to the negative reactors. There is then a low rate of infection in children; most of them reach adult life tuberculin negative and then encounter a strong infection risk on going out into the world. Among young adults the endo-epidemic phase presents high disease rates and acute progressions due to late diagnosis. The older age groups carry a high prevalence of infection, patients with chronic or residual disease showing a considerable/

considerable tendency to relapse. For the former group the tuberculin test is of supreme importance either as a preliminary to B.C.G. vaccination, as a means of discovering positive reactors or when performed at frequent intervals for negative reactors in discovering cases of silent infection (tuberculin matriculation)". Dr. Gedde-Dahl then described in detail a study he had made of this method in Norway "during the endo-epidemic phase". A limited population of 6,500 was followed up annually from 1937 to 1944 and again in 1952 by repeating the tuberculin test on negative reactors and X-ray examination of positive reactors. The result was that he was able to detect practically all those who had converted within the area; in the case of three quarters of those who had converted the sources of infection were traced; and further spread of infection from those who had converted with progressive disease was arrested to a very great extent within the observation period 7-15 years and the chain of infection broken. Dr. Gedde-Dahl concluded "The annual infection rate among negative reactors, which is the most accurate means of assessing the epidemic factor in tuberculosis, declined between 1940 and 1950 as follows: from 1.37 per cent to 0.09 per cent in school children, and from 3.44 per cent to 0.64 per cent in adults.

These methods appear to have been highly successful as both morbidity and mortality dropped to very low levels. Tuberculin matriculation may prove to be the better alternative to mass B.C.G. vaccination. It gives the basis for selective chemoprophylaxis and leaves the way open for selective control of positives, an increasingly important point. I do not believe it automatically precludes selective B.C.G. vaccination, which might also be profitable.

All preventive measures should be approached from the angle of present risk, not on risks or fears from former days. The possibility of measuring such risks should/

should not be destroyed".

The writer agrees with the views of Dr. Godde-Dahl in that the effective use of the tuberculin test is a more truly epidemiological approach to the present phase of tuberculosis control than is mass B.C.G. vaccination.

MacDougall et al 1953 discovered one new case of adult tuberculosis among contacts for every 250 tuberculin tests applied to school children. Another attempt to discover adult infections by tuberculin testing of school children was made by Ritchie, Calwell and Barr (1955) in East Belfast. 2,062 children were tested and 4,274 adult contacts were examined. The incidence of active post primary tuberculosis found in male contacts of non-reactors was 0.51 per cent and 2.50 per cent in male contacts of reactors. The corresponding figures for females were 0.42 per cent and 0.75 per cent respectively.

Tuberculin testing should be an integral part of all school medical examinations and in the control of tuberculosis would accomplish more with less effort than B.C.G. vaccination. At Child Welfare Clinics too, tuberculin testing of children brought to the Clinic for the first time and thereafter at regular intervals may bring to light undisclosed infectious tuberculosis in adults. It is widely recognised that if a child under 5 years is found to have radiological evidence of pulmonary tuberculous infection, tuberculous meningitis, miliary tuberculosis or simply a positive tuberculin reaction, then it is a fair assumption that infection has been contracted from someone in the family circle and investigation invariably leads to proof of this.

There are other two reasons why tuberculin testing of the under five's should be routine practice. The first is that tuberculosis in a child of tender years can be a very treacherous business. Primary infection undetected can silently lead on to complications, for example, atelectasis, pulmonary spread, miliary or meningitic spread. The earlier primary infection is recognised/

recognised the better. The second reason is that in view of the findings of the Thoracic and Cardiac Panel of the Adrian Committee (1961), that out of every 1,000 expectant mothers, chest X-ray examination may be expected to yield two active and hitherto undisclosed cases of pulmonary tuberculosis, there is a real danger of tuberculosis infection being passed on to some new born babies. The Panel recommended that chest X-ray examination of expectant mothers be carried out as a routine. If for one reason or another this examination is omitted then the babies should be tuberculin tested at 6 weeks and thereafter at regular intervals.

The home contacts of all positive reactors detected among school children or those under 5 years should be examined for tuberculin positivity and, if indicated, by chest radiography.

In order to obtain parental interest and co-operation the following letter was designed for child welfare clinics within the County of Lanark:

"Dear Parent,

Many of us announce our entry into the world with vigorous cries; some of us come in more quietly. But whether we make a noise about it or not we are all born with a good pair of healthy lungs. Now, as we grow up, our lungs breathe in all sorts of germs. Most of these cause no permanent harm, but one germ in particular may cause trouble in later life, namely tuberculosis. By the time we reach adult life the vast majority of people have had a small dose of tuberculosis although very few have actually been ill, and this is because the body builds up its own defence.

Now in the case of a young child it is important to know as early as possib if he has already had his <u>first</u> tuberculosis infection, and we find this out, first, by means of a test on the skin called the Tuberculin Test, then, and only/

only if the skin test is Positive, by an X-ray examination of the chest. The test itself is simple and painless and will not upset your child in any way.

The Doctor at the clinic will be very pleased to explain any point to you and he will, of course, give you further advice at the conclusion of the examination.

If you agree to this examination to safeguard the future health of your child, will you kindly give the particulars overleaf".

On the reverse side of this letter the parent is asked to give name, address and date of birth of the child, name of Family Doctor, and her own signature.

B.C.G. Vaccination

In this part of the paper comment is made on the place of B.C.G. vaccination in the control of tuberculosis.

Few topics in the field of tuberculosis have engendered such conflicting views as has the use of B.C.G. vaccine. For example, the present relatively high incidence of pulmonary tuberculosis in the middle aged and elderly raises some searching questions on the present policy of B.C.G. vaccination of new born babies and teenage school children; furthermore there is a school of thought which is not in favour of any policy of mass B.C.G. vaccination of non-contacts of any age.

What are the salient points for and against mass B.C.G. vaccination of non-contacts? There is abundant evidence that B.C.G. protection greatly reduces the incidence of primary tuberculosis and its complications, tuberculous pleural effusion, gross hilar adenopathy, meningitis and miliary spread. The question is does B.C.G. protect against destructive pulmonary tuberculosis which as Meyers has pointed out constitutes the real weight of the tuberculosis problem. Meyers questions the existence of immunity in tuberculosis. He affirms that no one has succeeded in producing dependable immunity by artificial means "probably because natural infection with virulent tubercle bacilli does not result in dependable immunity".

Professor Wallgren commenting on a study by Dahlstrom and Difs says "As far as I know this is the first time it has been satisfactorily shown that post primary tuberculous disease may to a certain extent be prevented by B.C.G. vaccination. It is conceivable that since early destructive pulmonary tuberculosis often develops as a progression of primary tuberculous foci in the lungs, the incidence of this type of destructive pulmonary tuberculosis ought to/

to be lowered in the people with no or with insignificant primary foci. Whether this decreased incidence of post primary pulmonary tuberculosis is valid for the early manifestations or holds true also for the late forms remains to be further elicited".

The studies of Stein and Aronson showed that pulmonary lesions (as noted by multiple chest X-rays) in the American Indians were 4 times as common in the controls (16.4 per cent) as in the vaccinated (4.1 per cent) when the findings were analysed 9 to 11 years after vaccination. For minimal, moderately advanced and far advanced pulmonary tuberculosis the percentages were 3 to 10 times as high in the controls as in the vaccinated group. One wonders what such a study would show 30 years after the original vaccination! Does B.C.G. vaccination in early life prevent clinical tuberculosis in the fifth and sixth decades?

One study which gives clear evidence that destructive pulmonary tuberculosis in the first three decades is appreciably lowered following vaccination with B.C.G. is the trial undertaken by the British Medical Research Council. (Progress Reports 1956, 1959, and 1963). It was found that there was a reduction of over 80 per cent in the incidence of tuberculosis in the B.C.G. vaccinated as compared with the tuberculin negative unvaccinated group. 63 per cent of the cases that developed tuberculosis in all groups were of the pulmonary type. Although no division was made in the cases of pulmonary tuberculosis between those showing primary pulmonary or other pulmonary lesions, cavitation was found in 13 of the 39 cases in the unvaccinated group and in 6 of the 13 cases in the vaccinated group (combined B.C.G. and vole bacillus).

J. Arthur Meyers states "A belief that high susceptibility and low resistance to tubercle bacilli obtains in certain age periods of life, notably infancy/

infancy and adolescence, has not been substantiated. The greater morbidity and mortality in these periods have been adequately explained on other grounds". Meyers further states, "The tuberculin reaction in a person who does not evidence tuberculosis is an ill omen because that person has a primary lesion, is a potential case of clinical disease and should be observed periodically for the appearance of such lesions. The tuberculin test detects invasions with tubercle bacilli earlier than any other phase of examination and identifies those persons whose infections persist at any future date. The tuberculin test is the only satisfactory criterion of the effectiveness of a tuberculosis eradication programme. In fact its values are so numerous and important that it has been designated the master key to the eradication of tuberculosis. B.C.G. nullifies the use of this master key. The tuberculin reaction only indicates the presence of allergy. Since the tuberculin has never been proved to be anything more than a test for allergy to tuberculo-protein there is no basis for using it as a criterion of immunity". To this might be added the comment of Rich, "There is no correlation between the degree of hypersensitivity and the degree of acquired resistance either in man or in lower animals". Many however would take the view that allergy is an incomplete expression of immunity. Meyers quotes Dubos as saying "The tuberculin test does not necessarily reflect immunity in tuberculosis", and he quotes Medlar "Tuberculosi cannot be effectively controlled until the problem of tuberculous reinfection has been met and it is because of this situation that prophylactic vaccination against tuberculosis as now advocated would seem to be rather a puny weapon. It is extremely doubtful that artificial vaccination can produce results superior to natural vaccination with smaller numbers of living virulent tubercle bacilli; and yet natural vaccination fails to control the disease. It appears illogical/

illogical to base a major attack against any disease on a skirmish against a minor phase of the problem. This is asking the tail to wag the dog. An effective control of tuberculosis cannot be obtained without a major attack on the source from which the disease is spread. The present programme of mass vaccination with B.C.G. does not touch this problem and it would appear illogical to anticipate that artificial vaccination could succeed where natural vaccination has failed".

Meyers further states "The tuberculin test is clearly the master key leading through all doors to the ultimate eradication of the tubercle bacillus. It is the earliest and most specific diagnostic procedure, the best epidemiological agent and the only measure by which the true magnitude of the tuberculosis proble in any area can be solved. It is the only prompt method of determining the effectiveness of a tuberculosis eradication programme. It may well now tell whe to start treating tuberculosis and also when to stop. All of these values are lost for persons of any age whose tissues have been sensitised by B.C.G.

Mass vaccination campaigns designed to find those who do not react to tuberculin and to produce tubercular lesions in their bodies with B.C.G. cannot solve the problem but add to its magnitude. It is the tuberculin reactors found in such campaigns who deserve our immediate and remote attention since it is among them that infectious cases already exist and others will evolve. As lo as such seed beds are allowed to exist, destruction from tuberculosis will contir unabated".

With the rapid decline in the incidence of tuberculosis phthisiologists particularly in the Scandinavian countries and in some States of the United States of America are having second thoughts on the need for mass B.C.G. vaccination in school children and in young adults. In these countries there are/

are now many areas where at the age of 13 years less than 5 per cent of children are tuberculin positive. By comparison, the percentage of positive reactors at 13 years in Lanarkshire schools remains between 15 and 20; the lowest figure obtains, as expected, in rural schools.

The World Health Organisation has for several years held the view that tuberculosis will cease to be a public health problem when the percentage of positive reactors at age 14 falls to 1. Thus in Lanarkshire we have still a long way to go.

The views of Meyers and others who are opposed to mass B.C.G. vaccination have been given at some length in this paper because in spite of the convincing evidence in favour of mass B.C.G. vaccination produced by the British M.R.C. trials so far as they have gone, it does seem to the writer that a stronger case can be made against B.C.G. vaccination of school children en masse in this country.

The value of B.C.G. vaccination to the individual contact of an index case is indisputable. In such a circumstance B.C.G. gives 80 per cent protection for about 10 years. What is debatable is the need for the wholesale vaccinatio of adolescents who are not contacts. When one considers the claims of many other problems upon the limited staff and time of most public health departments it is pertinent to ask if it would not be more practical and realistic to concentrate on using the tuberculin test in the child welfare and school medical service and the facilities of mass radiography as epidemiological and diagnostic aids in an over all tuberculosis control programme. Would such a policy not be better rather than devote considerable time and the very limited medical, nursin and administrative man-power to an intensive programme of B.C.G. vaccination of teenagers.

Finally/

Finally as regards the vaccine itself and its administration, a vaccine is awaited which will produce lasting immunity but without allergy. Such a vaccine should not produce a reaction on the skin but should produce serum antibodies which could be detected and measured thus indicating the state of immunity. It would be ideal if such a vaccine could be taken orally in tablet form.

Epilogue

Sunt lacrimae rerum et mentem mortalia tangunt. Aeneid.

Yet tears to human suffering are due;
And mortal hopes defeated and o'erthrown
Are mourned by man. Laodamia.

When one has come face to face with the poignant tragedy of tuberculosis and pondered on the impact which it has had on the human situation the words of Virgil and of Wordsworth come to mind. They seem to hold something of the depth of thought and feeling which this disease evokes in the mind and heart.

By whatever name it has been known - phthisis, a decline, consumption - tuberculosis has been a scourge of mankind down the ages. Death rates alone never did measure its full impact on society. The fundamental issue has always been morbidity measured in terms of chronic illness, respiratory crippling, physical incapacity, unemployment, loss of income, impoverishment, destitution, unfulfilled ambition, blighted hopes, separation from loved ones, and even social effacement.

Today, in the poorer, overpopulated and underdeveloped countries the menace of tuberculosis is still undefeated. In this country the tide began to turn against tuberculosis in the early nineteen fifties and has been gathering momentum since then. Each year illness from the disease has decreased in frequency and severity. Each year has brought a further reduction in the number of children at school leaving age who react to the tuberculin test. Not only infection but infectivity has receded. From 1952 to 1962 the number of notifications fell by 62 per cent. For countless generations tuberculosis took its toll of human life. As a cause of death it is now reduced to insignificant/

insignificant proportions. Tuberculous meningitis which was once a death sentence and the advanced stages of pulmonary tuberculosis which pursued its victim relentlessly have yielded to the new regime of treatment. From 1952 to 1962 the number of deaths fell by 71 per cent. In 1961 tuberculosis accounted for only 0.7 per cent of deaths of all ages. The eradication of tuberculosis, the objective on which medical men of an earlier day pinned their hopes and for which they laboured so valiantly, now seems within the realm of possibility.

What is meant by the eradication of tuberculosis? It means the ultimate goal when no human being reacts significantly to a skin test with a proper dosage of standardised tuberculin. In effect it means total bacteriological eradication. This may be a very distant ideal, yet progress must be made toward it. The objective for the immediate future is the elimination of tuberculosis as a public health problem. Tuberculosis remains a public health problem in a community so long as healthy individuals are exposed to the risk of being infected with virulent tubercle bacilli. Our aim should be to reduce the risk to such an extent that the elaborate control measures of B.C.G. vaccination of school children and group miniature radiography are no longer necessary, and it can be left to routine public health methods to investigate the few cases of tuberculosis which will continue to occur for several years.

The World Health Organisation has made a definitive proposal on the target for the eradication of tuberculosis. This proposal is based on a practical method of measuring the extent of the tuberculosis problem in a community. Morbidity and mortality rates are no longer accurate indications of the trend of tuberculous infection. Chemotherapy has virtually vanquished death specifically from tuberculous disease. The death rate no longer gives any indication of prevalence. In Scotland, as a result of community X-ray campaigns and intensiv

group radiography, morbidity rates can assume a false significance unless figures are carefully analysed in respect of sex, age group, the number of examinees in each age group, the area of survey, and the economic,social,and employment structure of the community. For example it is necessary to use all these indices in order to make a valid comparison between the prevalence of tuberculosis in industrial Lanarkshire and that of the north, north-east or south-east counties. What must be measured is the risk to healthy individuals of contracting tuberculous disease. This can be done most accurately by the tuberculin test. Reference has already been made to the value of tuberculin testing routinely all children from infancy to sixth form pupils at school. By analysing the results of these tests it should be possible to assess the risk of infection existing in a community. This index of the risk of acquiring tuberculosis forms the basis of the definition set by the World Health Organisation as the aim of eliminating tuberculosis as a public health problem. When less than one per cent of the children in a community at fourteen years of age are reactors to tuberculin then the risk in this community is so small that tuberculosis can no longer be regarded a public health problem. In Scotland during 1962 the percentage of the school population at age fifteen who were reactors to the tuberculin test was 18. This is the measure of how far we are from the target set by the World Health Organisation.

The history of the struggle against tuberculosis in this country since the beginning of the century is one of team work from dedicated individuals representing many different disciplines and fields of activity and of whole-hearted effort between official bodies and voluntary agencies. This concept of the physician and the layman working together to achieve a common health objective has reached a pinnacle of success in the fight against tuberculosis. What/

What a fine achievement this partnership effected in the Scottish X-ray Campaign of 1957-1958! Indeed, so successful and rewarding has been co-operatio between doctor and layman in the long struggle against tuberculosis that it provides both an example and an incentive for common action in other directions. One thinks particularly of the great things this partnership could accomplish in bringing help to the aged, the infirm, the mentally handicapped, and the mentally sick living in the community and in developing services for them. The concept of care and after-care which has been so outstandingly successful in the anti-tuberculosis movement opens up limitless possibilities for similar endeavour in other fields.

In the years shortly after World War II the incidence of tuberculosis and the mortality from it in Scotland were among the highest in Western Europe. In Scotland in 1914 the notification rate and the mortality rate for respiratory tuberculosis were respectively 200 per 100,000 persons and 104 per 100,000 persons. From then until the onset of World War II the work of tuberculosis medical officers, public health measures, consultation dispensaries, and sanatorium isolation and treatment were gradually bringing the disease under control. By 1939 the notification rate and the mortality rate had fallen respectively to 93 per 100,000 persons and 54 per 100,000 persons. The War brought a halt to this downward trend. War-time conditions conjure up all the factors which aggravate such an endemic disease as tuberculosis - mental, emotional and physical stress, inadequate diet, intercurrent illness, exposure, the herding of people in shelters, the evacuation of cities, and overcrowding generally. The morbidity and mortality rates of tuberculosis inevitably reached new peaks. In 1947 and again in 1948 the mortality rate was 66 per 100,000 persons, the worst it had been since 1929 when the figure was 67 per 100,000/

100,000 persons. In 1948 the percentage of active respiratory tuberculosis discovered in mass miniature radiography examinations was 0.7, the highest figure since the scheme began in 1945 when it was 0.5, and the highest it was to be in subsequent years. In 1949 the notification rate climbed to 167 per 100,000 persons, the highest it had been since 1917 when the figure was 171 per 100,000 persons. Although our country was never in a state of occupation by hostile forces during World War II, such was the impact of the War and its aftermath on the human scene that the ground which had been so valiantly won in the control of tuberculosis in the twenties and thirties was almost entirely lost. While the advent of anti-tuberculosis chemotherapy restored to health and fitness those who fell ill with tuberculosis in its early and moderate stages and rescued from death the victims of the more advanced stages of the disease it was not until 1959 following the conclusion of the Scottish Two Year X-ray Campaign of 1957-1958 that the notification rate (72 per 100,000 persons) fell below the level it had been at the outset of hostilities in 1939 (93 per 100,000 persons).

The dark days in the struggle against tuberculosis are thankfully behind us. The Scottish X-ray Campaign, community mass radiography surveys in areas which were not committed to the Campaign of 1957-1958, and the intensive follow-up from all these surveys have resulted in the incidence of tuberculosis falling to very low levels in the north and south of Scotland and have effectively loosened the grip which it has long had on the central industrial belt. Much remains to be accomplished but the future is bright with hope for the total overthrow of this disease.

In some regions of the world, notably the Central and Northern States of the United States of America, Ontario State of Canada, Denmark, and the Netherlands,/

Netherlands, tuberculosis has virtually been eradicated. In other areas of the world, in particular, Hong Kong, most of the States of India, West Africa, East Africa, Japan, Turkey, Portugal, and parts of South America, tuberculosis is widespread and a major public health problem. As long as tuberculosis remains unconquered in any region of the world it must be the endeavour of all who seek to promote the well-being of their fellow men to co-ordinate resources and bring succour to the people of that area. The struggle has not ended when we have seen the last of this disease in our own community and in our own country. We must strive for the day when all lands are free from this scourge which has harried mankind down the centuries.

"I hold the unconquerable belief that science and peace will triumph over ignorance and war ..... that nations will come together not to destroy but to construct ..... and that the future belongs to those who accomplish most for humanity."

Louis Pasteur.

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