

## ARE MASS MINIATURE X-RAY SURVEYS AMONG SOUTH AFRICAN WHITES WARRANTED?

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Mass miniature X-ray (MMR) surveying of the population is the only method available for the early discovery of pulmonary tuberculosis. This disease in its early minimal stage is easy to treat and has a cure rate of almost 100%. The cure rate varies inversely with the extent of the disease and with an increase in the number of cases seen which are becoming refractory to treatment, early diagnosis is of prime importance.

It is well known that in West Europe approximately one-half of the cases of pulmonary tuberculosis (PTB) notified annually are discovered by routine MMR. The incidence of PTB is also falling rapidly and a query becomes pertinent: Just at what stage in a country's control

programme for tuberculosis does the use of MMR become financially unwarranted? Jarman, Director of MMR in Cardiff, suggests that this stage is reached when 2 or less new cases are discovered per 10,000 pictures taken.

MMR surveys have been and are still being undertaken in the Republic of South Africa. In Springs over a 2-week period in 1961 some 19,634 persons were X-rayed with the following results:

	<i>No. X-rayed</i>	<i>Negative</i>	<i>New cases</i>	<i>Old cases</i>	<i>Untraced</i>
Whites	9,013	9,002	2	5	4
Non-Whites	10,723	10,632	45	30	16

Using Dr. Jarman's criteria as a yardstick, just how worth while was the Springs survey? In the Whites, with 4 persons untraced who had abnormal MMR pictures, 1 of whom statistically could have been a new case of pulmonary tuberculosis, a figure of just over 3:10,000 is obtained. Among the non-Whites the number of new positive cases per 10,723 cases X-rayed was 45, with 16 untraced who had abnormal MMR pictures. The possibility exists that 9 of these 16 untraced persons could have been suffering from PTB. The 'Jarman' index among the non-Whites X-rayed is thus 54:10,000.

It is debatable whether the survey was justified for the Whites. No one can gainsay that it was worth while among the non-Whites. I consider MMR surveys among the South African White population an unnecessary burden on a service already overloaded, but that not to undertake surveys among our non-White population in which a PTB epidemic continues unabated, would be almost culpable.

The finances of the Springs 1961 survey were as follows:

Total cost	R3,004.76
Amount recovered from industries, etc.	R1,712.99
Amount recovered from Town Council of Springs	660.88
Amount paid by SANTA (Springs)	630.89
<b>Total</b>	<b>R3,004.76</b>
The cost per plate was	R0.17
The cost per new White case discovered	±R750.00
The cost per new non-White case discovered	±R 33.00

However, it is just as important to report 'N.A.D.'

#### PRESENT SURVEY

With the knowledge of the achievement of 1961 and having been once again requested by local industrialists to repeat a survey in my area, a preliminary investigation has been undertaken. Two of the larger industrial concerns in Springs were invited to cooperate in the investigation.

It is accepted that the index of tuberculous infection in a community can be measured by the tuberculin test. This test separates those who have been, or are, infected, from those who are not. What is not known, however, is the actual index among our industrial workers, White or non-White, and the true significance of the positive reaction. Today the positive tuberculin reaction as a reliable index of TB infection is being questioned. Increasing use of BCG vaccination is clouding the issue and it is becoming apparent that 'atypical' non-pathogenic mycobacteria may produce cross-tuberculin sensitivity to the 2 known pathogenic strains.

#### 1. The SAPPI Survey, October 1965

This was to be an 'academic' survey and to this end a circular was handed to all White employees informing them about the survey and inviting their cooperation in the project. S.A. Pulp & Paper Industries employs 1,092 White men and women. Three shifts are worked and in order to see the maximum number of persons, it was necessary to visit the factory on 3 occasions, on pay days, and to time our visits between 12 noon and 3 p.m. over the 'pay-out' of morning and afternoon shifts.

All employees who volunteered were initially Heaf tested, using a 6-needle Heaf apparatus and freshly mixed

Weybridge tuberculin 1/1,000 1 ml. per 7 ml. normal saline. The right forearm was the test site in each case and the results were read after 7 days. Two 'PPD' sessions were held (the 1st and 2nd visits) and two 'reading and BCG' sessions (2nd and 3rd visits).

Readings were classified as follows:

Negative = No reaction after 7 days. Needle wounds only noted.

+ = Reaction around each needle wound, raised.

++ = Whole of site circumscribed by needle wounds raised.

+++ = Raised—blistered area beyond site of punctures.

All negative persons were given BCG vaccinations at the factory and positive reactors were invited to present themselves for X-ray of the chest.

Number of Whites employed by SAPPI ..... 1,092

Number of persons Heaf tested—3 visits of

3 hrs. each ..... 767

Heaf tested ..... 70%

Results of PPD Survey. Of the 767 persons Heaf tested, 688 reported back for the reading of the test, i.e. 91%:

	1-17 yrs.	18-49 yrs.	50 yrs. +	Total
Negative cases vaccinated	16	461	22	499
+	—	139	16	155
++	—	18	9	27
+++	—	4	3	7
	16	622	50	688

Of the 688 tests read, 22.53% were +, 3.92% were ++, and 1.83% were +++. Altogether 28.28% were tuberculin positive and could therefore be expected to have had tuberculosis at some time, signs of which would probably be apparent on X-ray examination.

X-ray findings. In order to maintain a level of consistency all 'positive' reactors were asked to visit the Town Council of Springs' fixed X-ray unit for examination. This machine is well known to me, the pictures obtained are good and, what is most important in the reading of 70 mm. X-ray photos, I am used to the interpretation of pictures from this machine.

Of the 189 persons invited to present themselves for X-ray, the cost to be borne by the Town Council of Springs and over a 2-week period which could inconvenience no one except myself and my 2 staff members, only 99 availed themselves of this service, as follows:

Heaf	+	75
Heaf	++	19
Heaf	+++	5
		—
<b>Total</b>		<b>99</b>

Results of MMR. Signs of old disease (apical scarring, calcified hilar glands or old calcified Ghon's lesion) were found in 6 cases, all of whom were only Heaf + positive. One of these who had bilateral apical scarring, most likely of old standing, has the same picture on a large plate, is being sputum-tested at present and is most likely an old healed case—he comes from Rotterdam and has no history of contact with PTB. A second, who is South African-born and with no history of TB or contact with a known

case, was also referred for a large plate and healed apical scarring is confirmed. Sputum-culture tests are being carried out but are not expected to be positive.

The 19 cases who were Heaf ++ positive showed no signs of PTB past or present, and the 5 cases who were Heaf +++ positive showed no signs of PTB past or present. No new cases of PTB were found among the 99 persons X-rayed. (These were the 99 persons of the 189 persons who were requested to report for X-ray—52.4%.)

#### 1. *The TMSA Survey, October 1965*

This was to be a 'blanket' survey. All employees, White and non-White, were to be asked to report for X-ray during the firm's time, to a mobile 70 mm. X-ray plant brought to the factory. All organization was left to the management of Telephone Manufacturers of S.A. They were to contact the Johannesburg branch of SANTA for the use of SANTA's mobile 70 mm. X-ray unit and to pay the cost thereof.

For the purpose of comparison, only White-employee figures are used.

TMSA employs 909 Whites. Of this number 636 were X-rayed during the two 4-hr. sessions that the mobile unit was in attendance. This makes the percentage White employees who were X-rayed 69.96.

Of the 636 persons X-rayed, 3 only were referred by the honorary radiologist of SANTA for large plates. This I have done and all 3 show old scarring only.

Out of the 636 persons X-rayed there were no new cases of PTB.

#### CONCLUSIONS

What do we learn from the above? Or rather, what do we confirm?

1. That the mountain certainly will not come to Mahomet—if we want to X-ray anybody we must go to him at the factory or in the street in front of his home.
2. That the tuberculin positivity of an adult White group in the Republic is likely to be just under 30%.
3. That the significance of a positive tuberculin reaction *under these conditions* is very doubtful and that the value of this test in the future, with widespread use of BCG, is likely to become less.
4. That MMR surveys of the White population group in South Africa are an expensive luxury and unproductive, and that these surveys should certainly be conserved for our non-White population.

I wish to thank the management and Chief Medical Officer, Dr. K. Sartorius, of S.A. Pulp & Paper Industries, and the management and Dr. W. Sacks of Telephone Manufacturers of S.A. for their great help in this survey. I should also like to thank my two departmental helpers, Mrs. J. Pollock and Mr. R. S. Corless, for their untiring assistance.