Analysis of Achievements in Sputum Case Finding for 1969

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<총 합>

전염병 관리의 기본 목적은 지역사회 전염을 신속히 감소시키는데 있다. 이 목적을 달성하기 위하여 전염원의 대부분을 발견하여야 하고 이들 발견된 자에게 적절하고 효과적인 치료를 가하여야 한다.

통계조사에 의하면 개방성 결핵환자의 약 90%는 호흡기증상(기침, 객담)이 있으며 이들중 균 배출량이 많은 고도 전염성 환자는 쉽게 직접 도말검사로서 결핵균이 증명된다.

정부는 결핵단원의 근원이 되는 전염성 환자 발견에 박차를 가하기 위하여 객담검진을 통한 환자 발견사업을 1967년말 부터 전개하였으며 1968년말까지 23,657명 1969년에는 24,313명을 발견하였다.

객담 검진 사업을 보다 효율적으로 하기 위한 방안을 모색하기 위하여 1969년 사업실적을 지역, 보건소, 보건지소 별로 분석하였다.

- 1) 총 665,750명의 객담 검사에서 3.7%인 24,313명을 발견하였으며 이는 추정된 전국 양성환자 226,000의 11%에 해당한다.
- 2) 지역별 발견율 비교에서 대도시 2.4%, 중도시 2.7%, 소도시 2.2%, 군 4.1%로서 군(농촌)지역이 가장 고율이었다.
- 3) 인구 1,000명당 발견비율은 0.83이었고 전체 발견 환자의 83.6%가 군 보건소에서 발견되었다.
- 4) 군부 지역에 있어서 면요원 1인당 연간 12.4명을 발견했으며 경북도가 17.5명으로 가장 성적이 좋았고 경남도가 7.7명으로 가장 부진하였다.
- 5) 객담수집 건수가 많을 수록 많은 환자가 발견되는 것이나 수집된 객담의 질 여하에 따라 발견율은 좌우된다.

본 사업의 개선을 위하여 가장 필요한 고려사항은 일선 사업요원의 사기 앙양과 요원의 훈련 및 계속적인 지도 감독이다.

The basic principle of communicable diseases control is to reduce as quickly as possible the transmission of the infection in the community. To achieve this, a high proportion of the spreaders of the organisms must be identified and all the cases discovered must be provided with effective and adequate treatment. It is estimated that there are about 226,000 infectious cases in Korea. In view of the vastness of the need and the limited resources available, the Government introduced the primary sputum test as a means of case-finding in late 1967. This method is not only simple and cheap, but also easily carried out by lay workers with a short period of training.

In the year of 1969, a total of 665,750 specimens were collected and 24,313 cases were discovered. To find out the factors related to the case-finding for further improvement, the writer has analysed the achievements in 1969 by province, health centre and myon sub-centre as follows.

PART 1

Analysis by Health Centres of
Different Categories

During 1969 a total of 665,750 sputum specimens were collected and examined. As a result, 24,313 cases were discovered, a discovery rate of 3.7%. The achievements are analysed by category of health centres, i.e., health centres in large, medium and small cities and guns, and shown in Table 1, which is further summarized below:

Cities of different size and guns	No. of specimens collected		No. of cases discovered		Discovery rate (%)
	Total	Per H. C. average	Total	Per H. C. average	
Large cities	93899	3478	2209	82	2.4
Medium cities	45105	4511	1222	122	2.7
Small cities	25508	1882	569	41	2.2
Guns	501238	3580	20313	145	4.1
Total	665750	3486	24313	127	3.7

As seen above, health centres in medium cities collected the largest average number of specimens among the others, and this was due to the sputum case-finding campaigns conducted in some of the medium cities, i.e., Suwon, Chunchon and Mokpo. If these three cities are excluded, the average number of specimens collected per H. C. becomes 1568, which is the smallest in the whole country and the average number of cases discovered becomes 44, about the same as in small cities.

When analysis is to be made of the achievements, the number of work units involved must be taken into consideration. For example, in large cities, such as Seoul, Pusan, Taegu, Inchon, there exist a multiple number of health centres, whereas other cities have only one health centre. Under the gun health centres, there are on average 10 health subcentres with at least one health aides available. In the table below, the percentage distributions of specimens collected and of cases discovered are shown in contrast to the percentage distribution of the number of health centres:

Cities of different size and guns	Health centres (%)	Specimens collected (%)	Cases discovered (%)
Large cities	14.1	14.1	9.1
Medium cities	5.2	6.8	5.2
Small cities	7.3	3.8	2.3
Guns	73.3	75.3	83.6
Total	99.9	100.0	100.0

It is readily seen above that the number of specimens collected was roughly in proportion to the number of health centres, but as far as the number of cases discovered is concerned, the distribution is slightly distorted. In general, the gun health centres contributed relatively more to the total than those in cities, and this is due to the higher discovery rate in guns. In other words, workers in the gun health centres or myon/eup subcentres collected the sputum more selectively, provided that the technique in microscopic examination is the same as elsewhere.

Again, the size of population served must be taken into consideration for evaluation of the accomplishment. The following table presents the number of cases discovered per 1000 population:

Cities of different size and guns	No. of population	No. of cases discovered	No. of cases discovered per 1000 pop.
Large cities	7552,273	2209	0.29
Medium cities	1199,693	1222	1.02*
Small cities	977,626	569	0.58
Guns	19478,254	20,313	1.04
Total	29207,856	24,313	0.83

*2.34 for Suwon, Chunchon and Mokpo combined and 0.40 for the remaining medium cities.

It is noted above that the number of cases discovered per 1000 population is higher for health centres in guns and medium cities. However, if the three cities where case-finding campaign was conducted are separated, the per 1000 case rate becomes only 0.40 for those in medium cities, which is even lower than the rate for those in small cities. The rate for

the whole country is 0.83 per 1000 which is much smaller than the target of 1.5~2.0 cases per 1000 as recommended by WHO, and even the gun health centres reached only two thirds of the target of 1.5 cases.

Finally, we have to know how many out of the estimated total of cases in the communities have been discovered, and analysis is made as follows:

The proportion of cases discovered among the total estimated is 10.1% for the country as a whole. It is as high as 41.0% for those in the medium cities, and this is mainly because of the sputum casefinding campaign conducted in three cities and the relatively low prevalence rate in the medium cities as revealed by the first prevalence survey. If these three cities are excluded, the case rate becomes 15.5%, which

Cities of different size and guns	No. of popul. 5 yrs & above	Prevalence rate of cases	Estimated total No. of cases	No. of cases discovered	Proportion of cases discovered
Large cities	6,494,955	0.7	45,464	2,209	4.9
Medium cities	1,031,736	0.3	2,982	1,222	41.0*
Small cities	878,503	1.0	8,785	569	6.5
Guns	16,751,298	1.1	184,264	20,313	11.0
Total	25,118,756	0.94	241,495	24,313	10.1

*90.8 for Suwon, Chunchon and Mokpo combined and 15.5 for the remaining medium cities.

Table 1. Achievements in Sputum Case-Finding by Categories of Health Centres, 1969

Large cities

H. C.	No. of specimens collected	No. of cases discovered	Discovery rate (%)	No. of cases discovered per 1000 population
Seoul(9)*	23,836	857	3.6	0.23
Pusan(6)	49,145	868	1.8	0.61
Inchon(4)	3,539	92	2.6	0.17
Taejon	858	28	3.3	0.08
Taegu(5)	13,634	254	1.9	0.30
Chunju	770	43	5.6	0.19
Kwangju	2,117	67	3.2	0.17
Total	93,899	2,209	2.4	0.29
Per H. C. average	3,478	82	2.4	

Medium cities

Suwon	6,646	216	3.2	1.68
Chunchon	16,605	353	2.1	3.52
Wonju	677	23	3.4	0.22
Chungju	821	26	3.2	0.32
Gunsan	1,556	28	1.8	0.27
Mokpo	10,875	347	3.2	2.14
Yosu	1,657	50	3.1	0.49
Masan	1,356	65	4.8	0.42
Chinju	1,526	46	3.0	0.43
Ulsan	3,386	68	2.0	0.60
Total	45,105	1,222	2.7	1.02
Per H. C. average	4,511	122	2.7	

Small cities

H.C.	No. of specimens collected	No. of cases discovered	Discovery rate (%)	No. of cases discovered per 1000 population
Wijongboo	736	27	3.7	0.36
Kangneung	928	36	3.9	0.55
* Sokcho	3644	52	1.4	0.82
Choongju	877	24	2.7	0.19
Chunan	676	39	5.8	0.55
Iri	833	28	3.4	0.36
Soonchon	4374	72	1.6	0.91
Kimchon	1491	50	3.4	0.88
Andong	1148	43	3.7	0.67
Pohang	2247	39	1.7	0.59
Kyongju	3566	41	1.1	0.48
Choongmu	2281	36	1.6	0.71
Samchonpo	1419	42	3.0	0.78
Cheju	1288	40	3.1	0.46
Total	25,508	569	2.2	0.58
Per H.C. average	1882	41	2.2	
Gun				
Total(140)	501,238	20,313	4.1	1.04
Per H.C. average	3580	145	4.1	
Whole country.				
Total (191)	665,750	24,313	3.7	0.83
Per H.C. average	3486	127	3.7	
Monthly per myon average	291	1.1		

*Figures in the parentheses are the number of health centre.

is still higher than the other cities and guns. In this analysis, the health centres in small cities do no longer show the smallest proportion, instead, a proportion larger than the large cities.

In conclusion, a total of 24 313 cases were discovered by the 192 health centres as a result of sputum collection and examination in 1969, the rate being 0.83 cases per 1000 population, and this number of cases discovered is one tenth of the estimated total of 226000 cases in the whole country. The gun health centres, the largest in number and also with its subordinate subcentres fully mobilized, contributed more to the total national accomplishment than the health centre in cities. The efficiency in term of discovery rate was also higher in the gun health centres. Among the city health centres, those in

large cities were the poorest because the per 1000 case rate and the proportion of cases discovered among the total estimated were the lowest, and this is mainly due to the relatively small number of health facilities and workers as compared with the size of population, 280 000 per health centre in large cities as a whole and 430 000 in Seoul City. This finding indicates an urgent need for corrective measures for such an unbalance in large cities.

PART 2

Analysis of Accomplishments of Gun Health Centres

As noted above, the gun health centres are the main forces in sputum case-finding in Korea, and

Table 2. Distribution of Gun Health Centres by Average No. of Cases Discovered per Myon Per Year and by Province, 1969 (January-December)

Average No. of cases per myon per year	Average No. of cases per myon per year										
	Kyonggi	Kang- won	Choong- Puk	Choong- Nam	Chun- Puk	Chun- Nam	Kyong- puk	Kyong- Nam	Cheju	Total	
										No.	%
0	—	—	—	—	—	—	—	—	—	—	—
1	—	—	—	—	—	—	—	—	—	—	—
2	—	—	—	—	—	—	—	1	—	1	0.7
3	—	—	—	—	—	—	—	1	—	1	0.7
4	—	—	—	—	—	—	—	1	—	1	0.7
5	—	—	—	—	—	—	—	3	—	3	2.1
6	3	—	—	—	—	—	—	1	—	4	2.9
7	2	1	2	1	1	2	—	3	—	12	8.6
8	2	—	1	—	2	1	1	2	—	9	6.4
9	1	1	1	—	—	4	—	3	—	10	7.1
10	3	1	1	—	—	—	1	1	—	7	5.0
11	1	—	3	—	1	1	—	2	—	8	5.7
12	—	—	—	—	—	2	—	—	—	2	1.4
13	1	2	—	2	2	2	—	1	1	11	7.9
14	1	—	1	2	1	1	—	—	—	6	4.3
15	—	1	—	2	—	3	2	1	—	9	6.4
16	—	2	—	2	2	2	3	—	—	11	7.9
17	—	—	—	—	1	1	1	—	—	3	2.1
18	1	3	—	—	2	—	1	—	—	7	5.0
19	—	—	1	1	1	—	5	—	1	9	6.4
20	—	—	—	1	—	—	3	—	—	4	2.9
21	2	2	—	—	—	1	4	—	—	9	6.4
22	2	—	—	1	—	1	1	—	—	5	3.6
23	—	—	—	1	—	—	—	—	—	1	0.7
24	—	—	—	1	—	1	—	—	—	2	1.4
25	—	—	—	—	—	—	—	—	—	—	—
26	—	—	—	—	—	—	—	—	—	—	—
27	—	—	—	—	—	—	1	—	—	1	0.7
28	—	—	—	1	—	—	—	—	—	1	0.7
29	—	1	—	—	—	—	—	—	—	1	0.7
30	—	1	—	—	—	—	—	—	—	1	0.7
31	—	—	—	—	—	—	—	—	—	—	—
32	—	—	—	—	—	—	—	—	—	—	—
33	—	—	—	—	—	—	—	—	—	—	—
34	—	—	—	—	—	—	—	—	—	—	—
35	—	—	—	—	—	—	—	—	—	—	—
36	—	—	—	—	—	—	1	—	—	1	0.7
Total	19	15	10	15	13	22	24	20	2	140	99.8
Provincial average No. of cases per myon per year	10.4	15.0	10.0	14.3	12.4	12.3	17.5	7.1	12.2	12.4	

Table 3. Distribution of Gun Health Centres by Number of Specimens Collected and Number of Cases Discovered Per Myon Per Year (1969)

No. of specimens collected per myon per year	No. of case discovered per myon per year								Total
	0~3	4~7	8~11	12~15	16~19	20~23	24~27	28~36	
0~99									0
100~199	1	7	14	4	8	1			35
200~299		5	8	4	6	5			28
300~399		6	7	7	8	7			35
400~499	1	1	2	7	4	3		2	20
500~599			3	5	2	2	1		13
600~699		1			1		1		3
700~799					1	1	1	1	4
800~899				1					1
900~1000								1	1
Total	2	20	34	28	30	19	3	4	140

with more than one thousand of myon health subcentres available, even higher accomplishments can be expected of gun health centres. For this reason, more detailed analysis is made of the achievements of gun health centres in 1969.

As seen in Table 2, 12.4 cases were discovered per myon per year for the country as a whole, or approximately 1.0 cases per month, which is only half the target of 2 cases per myon per month, or 24 cases per year. Only 7 health centres reached this target as seen in Table 2.

Kyongsang Pukdo showed the best achievements, a discovery of 17.5 cases per myon per year, and Kyongsang Namdo the poorest, only 7.7 cases. Choongchung Namdo and Kangwondo also showed good results, 15 and 14 cases, respectively.

For the country as a whole, half of the total of 140 gun health centres showed a discovery of less than 14 cases per myon per worker, and the other half 14 cases or more. The best health centre was the Seunsan Health Centre in Kyongsang Pukdo with a discovery of 36 cases per myon per year, and the poorest was the Hamyang Health Centre and the Kosung Health Centre in Kyongsang Namdo With a discovery of 2 and 3 cases only.

In order to see whether the number of cases discovered was in proportion to the number of specimens

collected, a correlation table was made and shown in Table 3. Intervals of 100 specimens and of 4 cases were arbitrarily used for classification of the numbers of specimens collected and the numbers of cases discovered, respectively, because of the average discovery rate for the gun health centres in 1969 was 4.1%, that means that it would be possible to discover approximately 4 cases by examination of 100 specimens.

As seen in Table 3, 30 health centres are on the diagonal line, and 63 above and 47 below that line, or 21.4%, 45.0% and 33.6%, respectively. This means that the number of cases discovered is not closely correlated with the number of specimens collected. For example, the best achievement shown by the Seunsan Gun Health Centre, i.e., a discovery of 36 cases per myon per year, was made by examination of 436 specimens only, with a discovery rate of 8.2%, whereas the poorest achievement shown by the Hamyang Health Centre were the combined results of both the small number of specimens collected and the low discovery rate, 2 cases from 114 specimens, the discovery rate being 1.0%.

In conclusion, to discover more cases, collection of a sufficient number of sputum specimens is necessary but more important is to collect good specimens from right persons and examine them carefully so that a fairly reasonable rate can be obtained. If all

the myon workers should work along this guideline, it should not be difficult to reach the target of 24 cases per myon per year. Then, the total number of cases to be discovered will be 35 352 or 15 039 more than the accomplishment in 1969 or 42.5% increase.

Thus, together with the improvement of sputum case-finding activities in the cities, this aspect of tuberculosis control will show further a step-forward, and it may be possible to discover one fifth of the estimated total each year. By giving treatment to all the infectious cases discovered, this will really exert a strong epidemiological impact on tuberculosis, and realize the successful control of tuberculosis in this country.

Discussion

We know now that the important source of infection is one who has a cough and is excreting tubercle bacilli in his sputum, which are mostly demonstrable on direct smear microscopy. Cases whose sputum is positive only on culture are relatively weak in its infectivity and, therefore, do not pose a serious danger to the community. Cases diagnosed on radiography alone with negative bacteriology are certainly non-infectious and in all probability not suffering from tuberculosis. The diagnostic value of X-ray cannot be denied, particularly for minimal pulmonary pathology. The question, however, remains that our country has neither a sufficient number of X-ray units to reach remote areas nor capacity of treatment to include all the unimportant suspects discovered by X-ray examination. Direct smear microscopy of sputum produced by symptom motivated persons suffering from a cough for more than two weeks is certainly the most productive way of identifying the sources of infection. Studies have shown that more than 90% of all the infectious cases in a community have symptoms and would voluntarily seek relief of their symptoms at the health center if they have a confidence in it and the service provided is readily available, convenient, courteous and free of charge.

In Korea, there are more than 226000 infectious tuberculosis cases(1965 survey data) widely scattered throughout the country, while medical and health facilities are usually limited and concentrated in the cities. From the epidemiological point of view, discovery of the undiscovered cases is the most urgent task, which, combined with thorough treatment of those thus discovered, would lead to the rapid reduction of tuberculosis in Korea. During 1969, 665 750 persons with symptom were examined by sputum test, and out of whom 24313 cases of tuberculosis were discovered. These new cases discovered by laymen in 1969 represent approximately 11% of the estimated total of infectious cases in the country. An average of 126 new cases were discovered by each health center and every myon worker discovered an average of 12 cases per year. This is really a great achievement in terms of productivity, cost and efficiency. For the more efficient conduct of the programme in the future the writer, wishes to bring out the following points for consideration:

- 1) The public must be well informed of the value and the accuracy of the diagnostic method for pulmonary tuberculosis and the forthcoming availability of such a service in their community.
- 2) Sputum collectors should teach the patients on how to raise the sputum from the bottom of the chest.
- 3) The workers should be thoroughly oriented in every step of the procedures, such as, talk to the public, collection of specimens, recordkeeping, slide labelling, smear preparation, staining, and the use and care of microscope, microscopic examination of the standard slides, etc.
- 4) For efficient work to be expected of the auxiliary workers, regular and close supervision of their performance by TB supervisory medical officers and technicians of provincial TB laboratory are vitally important.
- 5) To encourage the workers, provision of incentives should be considered.