

*Population studies may serve useful purposes not originally planned, as in this application of data collected on the sample population in the Arsenal health district in Pittsburgh.*

# Participation in the Allegheny County, Pa., Mass Chest X-ray Campaign, 1953

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MASS chest X-ray campaigns have been conducted in many cities in recent years to screen large population groups for previously undetected cases of tuberculosis, neoplasms, cardiovascular disease, and other diseases. Many of these campaigns, owing to skillful organization and tremendous effort, have been able to induce a large proportion of the population to participate in the campaign. Participation rates as high as 75 percent have been reported for some communities (1). However, even in the most successful campaigns, a sizable proportion of the population fails to avail itself of the opportunity to have a chest X-ray.

Although those working directly in the promotion of attendance have impressions as to the differences between the groups that participate and fail to participate, very little quantitative information is currently available on these differences. A description of the existing differ-

ences, between the group which participates and the group which does not, would seem to be useful from several points of view.

First, such knowledge would permit a better judgment of the effectiveness of an X-ray campaign in eliminating undetected cases of tuberculosis and other diseases from the population group surveyed.

Second, pointing up the group differences should assist those responsible for increasing the proportion participating in future campaigns of this type by indicating subgroups requiring special promotional attention.

Finally, students of mass phenomena may find interesting the characteristics of the two groups considered here.

With these considerations in mind, the biostatistics department of the Graduate School of Public Health, University of Pittsburgh, and the Pittsburgh and Allegheny County X-ray Survey Foundation initiated a project designed to compare the participants with the nonparticipants in the Allegheny County X-ray survey. The survey was conducted during April to September 1953.

## Procedures Followed

In connection with a series of community health studies (2, 3) being conducted by the Pittsburgh School of Public Health in the

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Arsenal health district of the city of Pittsburgh (Allegheny County), a wealth of information on a probability sample of approximately 3,000 households of the health district was available at the time the chest X-ray survey began. This general purpose sample, representing a population group of approximately 80,000 persons, offered a unique opportunity to study X-ray participation within a large group.

We believed that if the persons from these sample households attending the X-ray survey could be identified the available information could be used to characterize both the group which responded to the invitation to be X-rayed and the group which did not cooperate in the campaign.

It is the availability of information on the nonparticipants that makes this study unique and that also emphasizes that population studies, when properly designed, may frequently serve useful purposes not originally contemplated.

Briefly stated, our plan called for checking the names and addresses of persons 15 years of age and older—those eligible for X-ray—included in the Arsenal health district sample against the records of the X-ray survey organization in order to identify the participants in the sample.

The methods which the survey organization used to notify all participants of the outcome of their X-ray provided the mechanism for identifying the sample persons X-rayed. All persons X-rayed were mailed notices of a negative reading or were processed through the followup routine of the survey in the event of a positive reading. By separating the notices, of either type, for which the postal zone given in the address corresponded with one of the 4 zones covering the bulk of the Arsenal health district, 3,400 sample persons who participated in the X-ray survey were identified. At the time of our analysis, an estimated 100 sample persons who had participated remained unidentified.

Of the other nonidentified sample persons (15 or more years of age and resident of the 4 postal zones), a proportion had died, or moved away from the dwelling unit occupied at the time the most recent community health study survey was completed (in July 1952), or were institutionalized, or for other reasons had become ineligible

either for X-ray or for identification under the procedure followed. From other sources this proportion was estimated to be 12.3 percent of the total sample persons in the age group X-rayed.

If losses owing to deaths, moving, and so forth, were to be ignored, the participation rates in the Arsenal district would be underestimated.

To compensate for the tendency toward a negative bias in our estimated rates, adjustments for deaths, during the 1-year period (1952-53) since the latest health survey, were made by removing from the nonidentified group the 85 persons estimated to have died in the interim.

To provide for those persons who had moved, under the assumption that the characteristic "moved" is not associated with the characteristics under study, a proportionate age-sex reduction of the nonidentified group was accomplished by removing at random the required number of persons.

These operations are summarized as follows:

	<i>Adjust- ments</i>	<i>Adjusted numbers</i>
To number of persons X-rayed and identified.....	3, 400	
Add estimated number of persons X-rayed but not processed by October 1953.....	100	
Total.....		3, 500
From number of persons not identified as X-rayed.....	3, 303	
Deduct:		
Estimated deaths since July 1952.....	85	
Estimated number of persons moved.....	644	
Estimated number of persons X-rayed but not processed by October 1953.....	100	
Total.....		2, 474
Total sample persons (15 years or older, resident of Pittsburgh postal zones 1, 6, 24, and 32 in July 1952).....		5, 974

From these data an estimated participation rate of 59 percent is indicated for the eligible portion of the sample. This participation rate is considerably lower than the 76 percent reported for Allegheny County as a whole (1). However, a more realistic rate for the county would include adjustments for multiple X-rays for the same person and X-rays of persons not residents of the county. From the informa-

tion available, it may be estimated that these adjustments would reduce the county participation rate to 65-67 percent. Furthermore, the net effect of the possible errors of identification in our procedures is undoubtedly in the direction of an undercount of the persons attending. Thus, the apparent discrepancy between Allegheny County and the Arsenal health district in attendance performance, as indicated by the two rates quoted above, is sharply reduced.

All comparisons in the following sections will characterize the group of 3,500 persons X-rayed and the group of 2,474 persons who, although eligible, did not have a chest X-ray. The assumptions underlying the adjustments we have made appear to be reasonable. However, it is felt that considerable deviations from the assumptions would be necessary to vitiate the comparisons of the two groups which follow. Our findings will be presented in four broad categories:

- Basic age, sex, and racial differences in the two groups.
- Health differences.
- Differences in various social characteristics.
- A brief examination of the attendance pattern within families.

### Age, Sex, and Racial Differences

Since age, sex, and racial differences in participation are expected a priori and since most of the other findings will be presented in terms of age-sex specific participation rates, we shall examine these characteristics first.

Estimates of the sampling variation of the participation rates quoted are not included in the tables or text to follow. However, the number of cases upon which the rates are based is generally shown, and the extent to which sampling variation may contribute to an observed difference in rates may therefore be assessed.

Table 1 and figure 1 show that the basic age pattern of response to the survey is common to both sexes. It is characterized by a peak among adolescents followed by a sharp drop in the early 20's, a rise to another peak in middle life, and then, after age 55, by a steady decline to a very low response among the elderly. This same pattern will be found in the 1946 Muscogee County, Ga., chest X-ray

survey (4) and the 1950 Los Angeles county-wide survey (5).

Among all the age-sex groups studied, the highest response came from girls between 15 and 19. Below the age of 35, women responded more than men, with the exception of those in the 25 to 29 age group. Their attendance forms an interesting contrast with the consistently higher response of men in all age groups beyond 65. Between 35 and 65, there are differences in response between the sexes, but the differences show no consistent pattern.

Small differences in participation rates were observed for white and nonwhite persons (58.8 and 54.2 percent, respectively), but the number of nonwhite participants in the sample was insufficient to permit age-race comparisons.

### Health Status and Health Awareness

As measures of the current health status of the two groups, data on hospitalization during the year July 1951 to July 1952, for all admissions other than delivery, pregnancy complications, and physical checkups, data on a specific reported condition—heart disease—and data on chronic illness are available from the 1951 household survey for comparison.

A comparison of the participation of persons hospitalized during the year preceding the survey with those not hospitalized reveals a small difference in the overall participation rate between our two groups, 56 percent for X-ray respondents and 59 percent for those who did not respond.

All persons reported to have one or more of the following conditions were classified as chronically ill:

Rheumatism	Hardening of the arteries
Arthritis	Hernia
Heart disease	Loss of use of limbs
High blood pressure	Blindness
Diabetes	Deafness
Kidney trouble	

Persons of both sexes with chronic illness responded to the X-ray invitation at only a slightly lower rate than those not chronically ill, 57 and 59 percent, respectively.

For the single condition, heart disease, the corresponding figures are 55 and 59 percent. The data also indicated that participation of the chronically ill, as compared with those free

of chronic illness, varied with age, but not in a simply described pattern. For the age group 65 and over, the difference in participation was accentuated, 39 percent for the participants and 48 percent for the nonparticipants.

Two additional items related to health awareness were studied, X-ray of the chest during the year preceding the mass campaign and health insurance coverage. Our data indicated that X-ray of the chest in the year before the mass campaign was not a significant factor in relation to participation.

Turning to health insurance coverage, however, we find striking features in the data (fig. 2 and table 2). We see that those who do have health insurance coverage have a markedly higher participation rate than those not having such insurance and that this finding holds true for every age and sex category.

To summarize the findings in this section, we can say that—

Variation in participation by health status is clearly in evidence though, on the whole, not of a striking nature.

As age advances, persons with chronic conditions appear to participate in smaller numbers than those who are free of these illnesses.

Hospitalization in the year preceding the survey is associated with a lower participation rate.

By far the most interesting finding, and one worthy of speculation, is the higher response of persons who have some kind of health insurance.

### Social Characteristics

Our findings on four social characteristics—education, marital status, type of occupation, type of industry in which employed—which may relate to a person's motivation to participate or ability to conveniently get to an X-ray unit, should be particularly interesting to those responsible for promoting mass health campaigns. The isolation and characterization of groups with a noticeably poor attendance record, as was done in the preceding section, also relate to the principal objective of the survey, the detection of unknown cases of tuberculosis.

#### Education

Our inquiry into the variation of attendance with years of formal education showed variation in participation by highest grade of school completed within the different age groups, but no systematic influence of education was discernible. The breakdown by age and educational attainment did reveal, however, the poor attendance among young men over 15 and under 24 who have completed high school (29 percent)

**Table 1. Number and percent X-rayed in sample of persons eligible for X-ray, by age and sex, Arsenal health district, Pittsburgh, 1953**

Age group (years)	Men				Women			
	X-rayed	Not X-rayed	Total	Percent X-rayed	X-rayed	Not X-rayed	Total	Percent X-rayed
15-19	186	100	286	65.0	219	92	311	70.4
20-24	100	186	286	35.0	123	137	260	47.3
25-29	156	118	274	56.9	162	135	297	54.5
30-34	157	118	275	57.1	213	129	342	62.3
35-39	207	102	309	67.0	190	124	314	60.5
40-44	186	93	279	66.7	210	131	341	61.6
45-49	173	80	253	68.4	186	88	274	67.9
50-54	146	73	219	66.7	163	77	240	67.9
55-59	137	81	218	62.8	124	92	216	57.4
60-64	89	88	177	50.3	93	73	166	56.0
65-69	74	56	130	56.9	72	71	143	50.3
70-74	36	39	75	48.0	45	60	105	42.9
75-79	17	26	43	39.5	16	35	51	31.4
80+	8	21	29	27.6	12	49	61	19.7
Total	1,672	1,181	2,853	58.6	1,828	1,293	3,121	58.6

## Participation in X-ray survey, Pittsburgh, 1953.

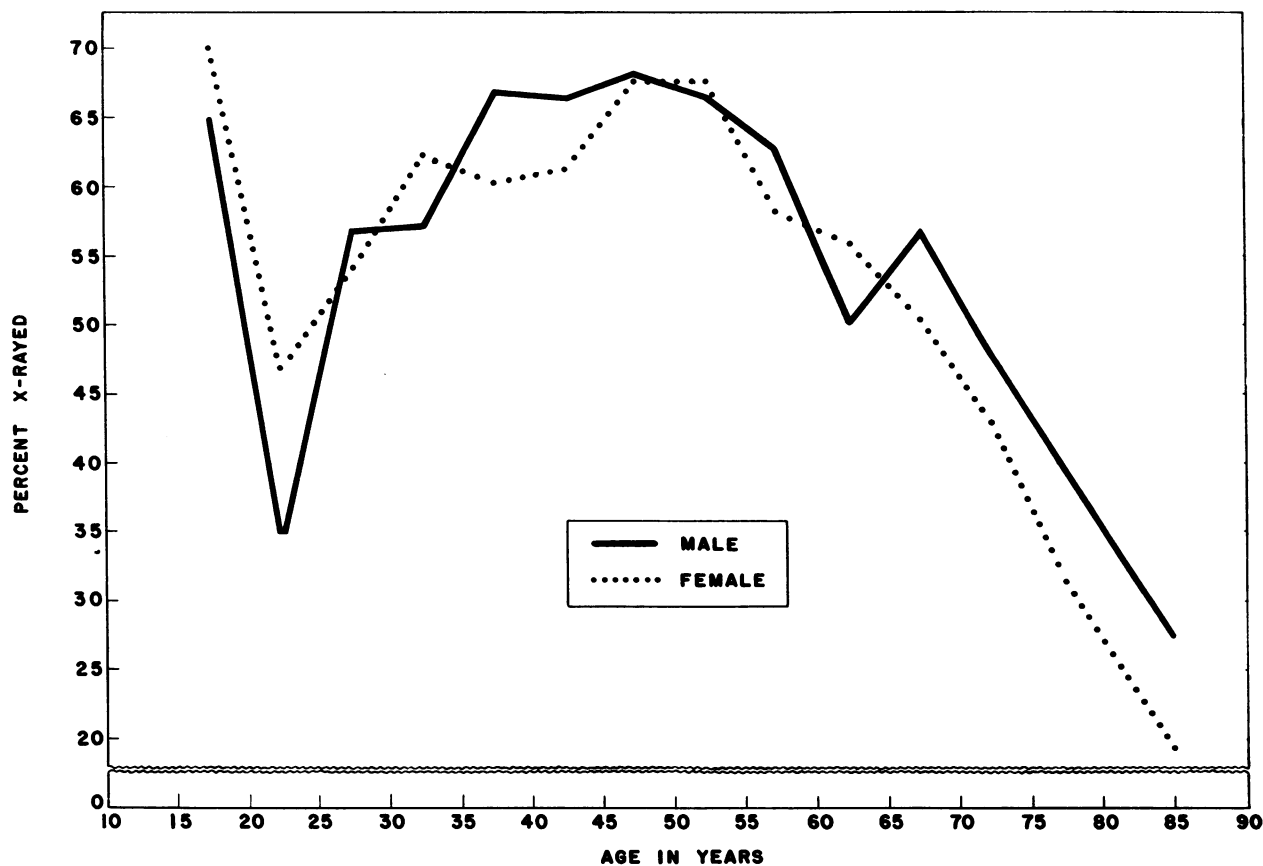


Figure 1. By age and sex.

and the poor attendance of both men and women in the oldest age group who had completed less than the fifth grade (38 and 33 percent, respectively).

### *Marital Status*

Our findings with respect to the relation between attendance and marital status are summarized in figure 3. Although the percentage of married persons who responded to the survey (61 percent) is somewhat greater than that of single persons (54 percent), interpretation of this difference is complicated by the relation between marital status and participation, as found in the age group 15 to 24. The relationship is the reverse of that observed in all the other age-sex categories. From figure 3 it can be seen that the single women in the 15- to 24-age group had the highest percent response of the 16 age-sex-marital status categories (65 percent) and that the married women showed the poorest response (29 percent). The difference between married and single men in this age

category, although similar, is not as striking. For the remaining age-sex categories, married persons consistently attended in greater proportion than single persons.

### *Type of Occupation*

Participation is summarized in table 3 by type of occupation for all ages combined. The highest participation rate was achieved among women classified as students (72 percent). This is largely accounted for by the excellent response of the girls of high school age. If the age group 15-17 is considered, almost all of whose members are high school students, 77 percent of the girls and 69 percent of the boys are estimated to have participated. These percentages point up the success of the X-ray campaign in the secondary schools.

Table 3 also shows that sales workers of both sexes and male clerical workers responded well.

The poorest attendance was found among men and women having "no usual occupa-

### Participation in X-ray survey, Pittsburgh, 1953.

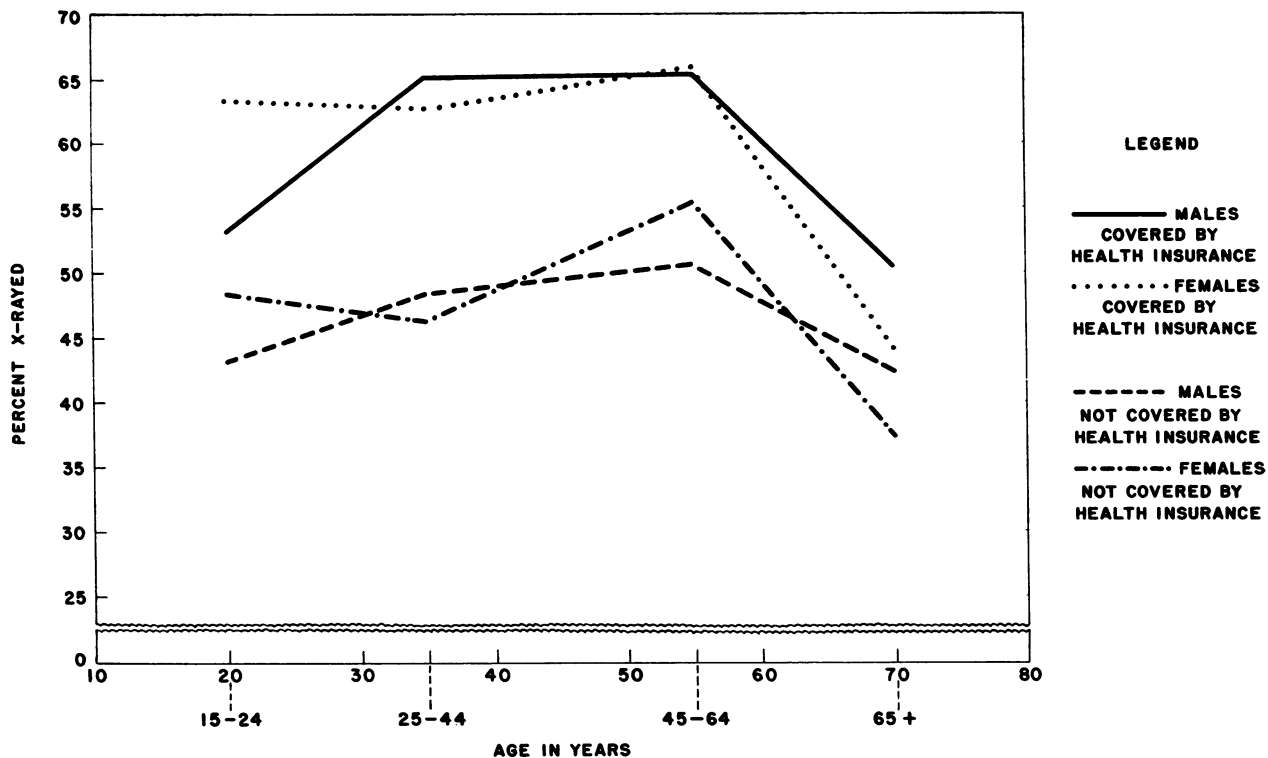


Figure 2. By age, sex, and health insurance coverage.

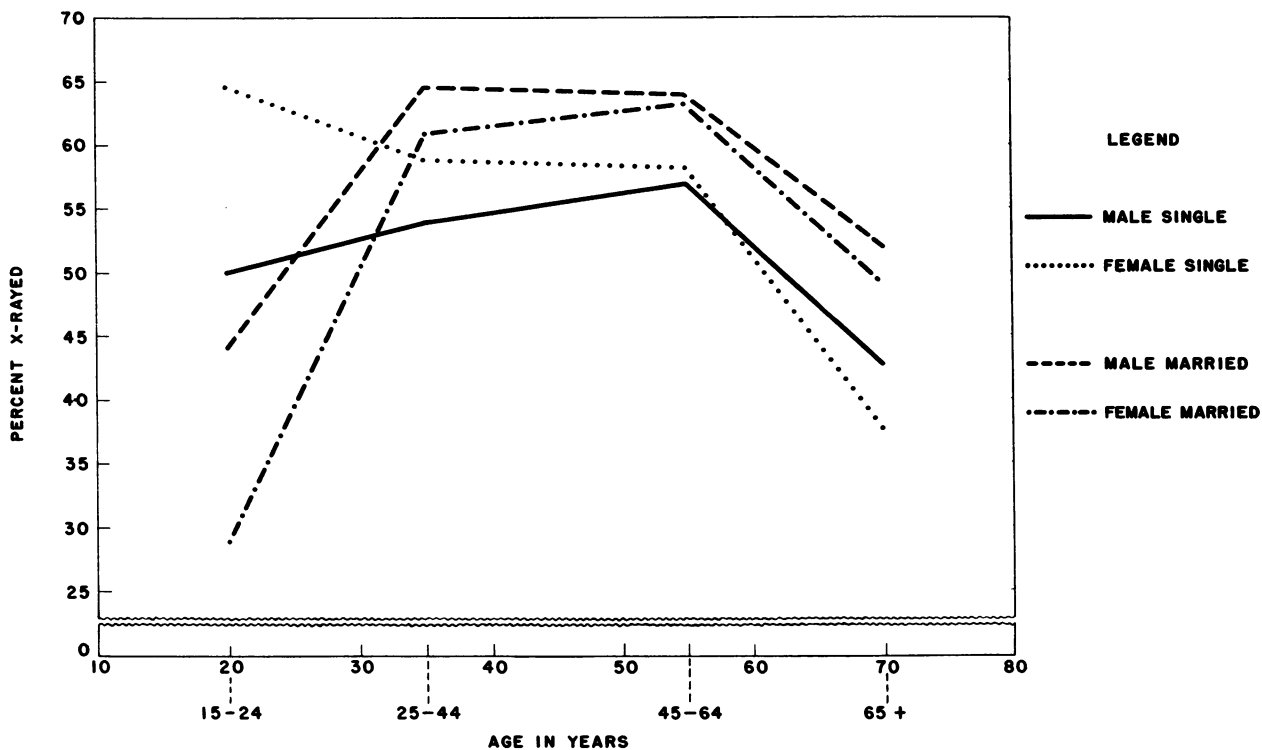


Figure 3. By age, sex, and marital status.

tion." This category consists largely of persons 65 years and over and those who are retired or disabled. The attendance of housewives as a group was somewhat below the average of the entire sample, but an analysis by age indicates that the response was poor among housewives aged 15 to 24 years and over 64. In these age groups, 38 percent of the housewives in the sample were X-rayed, as compared with 62 percent of the housewives between 25 and 64. The comparison of attendance between the white collar and the labor groups indicates that the response was better among white collar workers for both sexes, 62 and 57 percent, respectively.

### *Employment Factors*

If the 13 type-of-industry classifications used in this study are divided into 2 categories, one consisting of the 7 highest in percent of response to the X-ray survey, and the other consisting of the 6 lowest in response, we find the following division and ranking:

#### *Highest*

Students  
 Finance, insurance, real estate  
 Manufacturing—durable goods  
 Wholesale and retail trade  
 Manufacturing—nondurable goods  
 Transportation, communication, etc.  
 Mining and construction

#### *Lowest*

Housewives  
 Public administration  
 Personal, professional, entertainment services  
 Retired  
 Unemployed  
 Disabled

NOTE. These classifications are based, with some modifications, on the "category of industry" classification used by the Census Bureau. The modifications consist of (a) grouping together "personal services," "professional services," "entertainment services"; (b) separating "students" from "professional services" and "housewives" from "personal services" and (c) adding "retired," "unemployed," and "disabled."

An interesting pattern emerges from this kind of grouping. Each of the seven classifications found to be highest in X-ray attendance represents either a business, industrial, or educational organization; or, we might say that persons in these categories frequently are drawn from large aggregates of persons working under one roof or in a small area. On the other

hand, this is also descriptive of "public administration," which is among the six classifications lowest in response. The other five groups comprise the following: people who do not work (the retired, unemployed, and disabled), self-employed persons (personal, professional, and entertainment services), and housewives.

The higher response of the first category of persons may be explained by one or more of the following reasons:

The effectiveness of a group in stimulating an interest in the X-ray survey.

A planned campaign on the part of the organization, on its own or in cooperation with the Allegheny County X-ray Survey Foundation.

The convenience of the X-ray unit to persons working in these organizations.

The very high response of students (67 percent), discussed previously, is best explained by the effectiveness of the secondary schools in utilizing their resources and position to bring the students, in a sense a captive group, to the X-ray unit. At the other extreme are those who are retired, unemployed, and disabled (47-percent participation for all of these). The poor response of this group may be due to factors relating to age, inaccessibility of the X-ray unit, and the lack of a group stimulus.

By summing up the findings relating participation to the social characteristics of the individual, we can see that the data in this section indicate that participation of married persons was somewhat greater than that of unmarried persons, with the exception of the 15 to 24 age category, where the reverse was true. The response of married women was considerably lower than that of the unmarried women in this group. Apart from the poor response of persons with less than 5 years of schooling, there appeared to be little relationship between the highest grade of school completed and participation in the X-ray survey, so that this set of data would fail to support the hypothesis that people with higher educational attainment are more likely to volunteer for a chest X-ray.

These findings imply that, with the exception of age, the personal characteristics that were studied, such as sex, education, and marital status, are of minor importance in explaining differences in participation in the X-ray survey,

**Table 2. Number and percent X-rayed in sample of persons eligible for X-ray, by age, sex, and health insurance coverage, Arsenal health district, Pittsburgh, 1953**

Age group (years)	Men			Women			Total X-rayed (percent)
	X-rayed	Not X-rayed	Percent X-rayed	X-rayed	Not X-rayed	Percent X-rayed	
Health insurance coverage							
15-24	204	178	53.4	272	155	63.7	58.8
25-44	600	319	65.3	665	392	62.9	63.5
45-64	464	244	65.5	430	222	66.0	65.7
65 and over	77	64	54.6	61	76	44.5	50.0
Total	1,345	805	62.6	1,428	845	62.8	62.7
No coverage							
15-24	82	108	43.2	70	74	48.6	46.0
25-44	106	112	48.6	110	127	46.4	47.5
45-64	81	78	50.9	136	108	55.7	53.8
65 and over	58	78	42.6	84	139	37.7	39.6
Total	327	376	46.5	400	448	47.2	46.9
Grand total	1,672	1,181	58.6	1,828	1,293	58.6	58.6

and that the differences that do exist are more closely associated with occupational and employment characteristics. Among all of the occupational groups, the best response was obtained from persons of high school age. It was also noted that a better participation record was made by persons who performed their occupations in large organizations than by housewives, or by those who were self-employed, or unemployed for one reason or another. It appears, therefore, that we must look to the group rather than to the individual to understand the participation patterns observed in the survey.

**Family Unit Characteristics**

In the preceding sections our findings have been presented in terms of characteristics of the individual as they relate to his attendance performance. We now turn to a brief examination of X-ray attendance by members of the same household. Our definition of household is the same as that employed by the Bureau of the Census, which principally requires that the group of persons constituting a household live under a common roof and share common eating facilities.

A striking variation in household attendance patterns, according to whether or not the head of the household was X-rayed, may be observed in tables 4 and 5. Here is one of the most interesting findings of the study: There appears to be a marked tendency for persons of the same household to react in a similar fashion to the X-ray invitation.

For households composed of only two persons it can be seen that in 65 percent of the homes (table 4) when the household head had a chest X-ray so did the other member of his household; on the other hand, if he did not take part in the campaign, the other person attended in only 40 percent of the cases.

The manner in which this tendency manifests itself for the other three sizes of households covered may also be observed in the table.

There are many possible explanations for the observed relation, and it should be mentioned that our choice to present this finding in terms of the attendance of the head of the household was principally one of convenience.

It may also be observed that this comparison by size of household is a gross comparison: Age, sex, race, occupation, and similar characteristics of the household members are in no way



standardized. From some points of view, this makes this finding even more striking.

In table 5 we have a similar comparison where the household units have been standardized to the extent that they have been grouped by size as measured in terms of number of persons 15 years of age and older (the group eligible for X-ray). The attendance pattern of nonheads of households has changed from that observed in table 4. However, the positive association between the attendance of the head and the attendance of greater numbers of other members of his household is perhaps even more evident, now that the children have been removed from the comparison. It is noteworthy that evidence of intrafamily influence was also found in the Muscogee County, Ga., chest X-ray survey of 1946 (4).

### Social Welfare Status

Finally, from a study (6) of the relation between health status and social welfare status we have a classification of our sample households as measured by whether or not the household is known to the Pittsburgh Social Service Agencies through requests by one or more members of the household for assistance from the agencies. The proportion X-rayed (55 percent) in households with active cases, as of

July-December 1951, is somewhat lower than the corresponding proportion (61 percent) in households not known to the agencies, particularly for women (53 and 61 percent). However, the response among the "needy and troubled" is not alarmingly low.

### Discussion

The many factors that may be at work simultaneously to impel a person to volunteer for an X-ray pose a problem in interpreting the data. If the data indicate that a certain characteristic is associated with X-ray attendance, an interpretation of that relationship is difficult to make because the observed association may merely be a manifestation of one or more significant, but unknown, underlying factors. For this reason, the principal objective of the study has been largely restricted to a report of facts about the two groups.

However, several tentative conclusions concerning the factors that influence attendance seem warranted from an evaluation of all the findings. First, although a number of differences have been noted between the group that participated and the group that failed to respond, the differences generally are not large. Racial, sex, education, health and welfare status differences in the two groups, in general, are

**Table 3. Number and percent X-rayed in sample of persons eligible for X-ray, by sex and occupation, Arsenal health district, Pittsburgh, 1953**

Occupation	Men			Women			Total X-rayed (percent)
	X-rayed	Not X-rayed	Percent X-rayed	X-rayed	Not X-rayed	Percent X-rayed	
Professional and technical workers.....	88	65	57.5	41	29	58.6	57.8
Managers, officials, proprietors.....	133	78	63.0	15	13	53.6	61.9
Clerical and kindred workers.....	139	75	65.0	186	127	59.4	61.7
Sales workers.....	82	41	66.7	48	21	69.6	67.7
Craftsmen and foremen.....	365	266	57.8	-----	-----	-----	57.8
Operatives and kindred workers.....	287	196	59.4	55	46	54.5	58.6
Private household and service workers.....	86	64	57.3	94	68	58.0	57.7
Laborers.....	177	149	54.3	-----	-----	-----	54.3
No usual occupation.....	74	86	46.3	32	43	42.7	45.1
Housewives.....	-----	-----	-----	1,091	819	57.1	57.1
Students.....	204	122	62.6	236	93	71.7	67.2
Others.....	37	39	48.7	30	34	46.9	47.9
Total.....	1,672	1,181	58.6	1,828	1,293	58.6	58.6

not striking. Even with respect to age, for which the observed differences have been discussed earlier, the participation rate in the age category 65 and over is estimated to be 44 percent, as compared with 59 percent for all ages.

These facts would seem to indicate that the organizational and promotional activity of the Allegheny chest X-ray survey had a very broad base and motivated large numbers of persons in all walks and stations of life. The data presented here do not seem to indicate that the factors of training, education, and conditioning, which might be thought to stimulate awareness of the importance of periodic health examinations, were important in increasing X-ray attendance. There is little evidence that a greater amount of education is associated with a higher rate of participation. Rather than increased attendance with advancing age the data showed a decline in participation as age increases beyond the middle years. Furthermore, there is little evidence in the data to suggest that a chronic illness or a recent hospitalization was an important factor in influencing attendance.

Although the factors described in the preceding paragraph apparently are not strongly associated with the decision on the part of a per-

son to divert himself from his normal daily habits and step into an X-ray booth, there is evidence in this study of the effect of motivation of the individual through the group or groups of which he is a member. It was found that persons who were self-employed, or not employed, had a lower attendance than those associated with insurance and real estate firms, schools, and industrial and commercial establishments, where social pressures and concerted effort on the part of the organization might be easily applied.

A similar impetus may have been responsible for the observation that in households where the head participated in the X-ray campaign, larger numbers of other household members also participated than where the head failed to attend. Another piece of evidence that fits into this pattern is the finding that persons covered by health insurance participated in larger numbers than those not so covered. Since health insurance coverage is positively associated with working in large establishments, through the high prevalence of group plan insurance in these concerns, this finding is consistent with the hypothesis advanced.

The reasons for the positive association be-

**Table 4. Percent response to X-ray invitation, by household size and X-ray status of all household members, Arsenal health district sample, Pittsburgh, 1953**

Size of household	Number of households	Percent of households with indicated number of nonheads X-rayed				
		0	1	2	3	4 or more
		Household head X-rayed				
1.....	66					
2.....	271	35	65			
3.....	308	20	50	30		
4.....	297	15	51	25	9	
5 or more.....	337	17	34	25	15	9
Total.....	1,279					
		Household head not X-rayed				
1.....	58					
2.....	234	60	40			
3.....	239	45	44	11		
4.....	171	44	35	16	5	
5 or more.....	211	27	30	28	13	2
Total.....	913					

**Table 5. Percent response to X-ray invitation, by household size, as measured in terms of eligibility for X-ray, and by X-ray status of all household members, Arsenal health district sample, Pittsburgh, 1953**

Size of household	Number of households	Percent of households with indicated number of nonheads X-rayed				
		0	1	2	3	4 or more
		Household head X-rayed				
1.....	69					
2.....	586	31	69			
3.....	319	14	37	49		
4.....	178	7	28	39	26	
5 or more.....	127	16	16	20	24	24
<b>Total.....</b>	<b>1,279</b>					
		Household head not X-rayed				
1.....	60					
2.....	452	61	39			
3.....	192	25	50	25		
4.....	105	43	26	20	11	
5 or more.....	104	11	23	39	22	5
<b>Total.....</b>	<b>913</b>					

tween participation and group membership cannot, of course, be determined from the data at hand. Another interpretation of the higher participation rates in the groups mentioned is that of accessibility of the X-ray unit to the person whose participation was sought. The higher rates in the groups of school children, industrial and commercial establishments, and other establishments where large numbers of persons assemble in pursuance of daily tasks may be simply a reflection of success in locating an X-ray unit in or near the premises so that difficulty in seeking the X-ray was minimized.

Although it seems doubtful that mass X-ray campaigns for the detection of tuberculosis, such as the type of campaign described here, will be undertaken in the future should the present downward trends in incidence of tuberculosis continue, this discussion cannot properly be ended without commenting briefly on what the findings indicate with respect to detecting new cases of tuberculosis in the community. Since the tuberculosis problem is becoming more and more a problem of an aging population, the falling off in participation after the middle years to low participation among elderly persons (table 1) would indicate that

the results would be poor in these age groups.

Several other groups with low participation rates were isolated in our study. Those that are particularly interesting in this connection are (a) married women in the age group 15 to 24 and (b) persons retired, disabled, or unemployed for other reasons. Both these groups merit special attention when survey groups are considering ways of detecting new cases of tuberculosis. The first group contains a high proportion of young mothers, and the second contains the elderly, both groups that should be important targets for case-finding activities.

### Summary

At the end of a campaign designed to motivate a large population group to participate in a community venture, such as a chest X-ray survey, the question is always raised as to the characteristics that distinguish the group which responds from the group which fails to respond. During the Allegheny County X-ray survey conducted from April to September 1953 a unique opportunity for studying these group differences was available to the Graduate School of Public Health, University of Pitts-

burgh. An equiprobability sample of 5,974 persons, 15 years of age and older, representing a population group of some 80,000 persons residing in the Arsenal health district of Pittsburgh, provided information on many characteristics of both the group which participated in the survey and the group which failed to participate. We have presented the findings of the inquiry into the reasons for these differences.

From an overall point of view the differences between the two groups, while sizable for certain characteristics, are generally not extremely large. Some of the differences that do exist, however, suggest certain factors that may be related to participation in the X-ray survey. Comparisons between the participants yielded the following important findings:

In examining X-ray response according to age, it was found that comparatively high participation rates occurred among adolescents and middle-aged individuals. Relatively poor responses were noted among persons in their early 20's and those 65 years and older.

Among persons 25 years or older, the response of married persons in each age group studied was greater than that of the unmarried.

The participation rate of students of high school age was the highest among all occupational categories studied. The data also indicated a tendency of persons who worked as part of a group to have a higher response rate than those who were self-employed or not employed.

Persons who were covered by some form of health insurance showed a considerably higher rate of participation than those not covered. This finding was true of each age-sex category.

Evidence of forces within the family unit to

stimulate participation in the X-ray survey was demonstrated by a comparison of attendance in households according to whether or not the head of the household volunteered for an X-ray. The pattern of participation in households where the head did attend clearly indicated a greater response in these households than in those where the head did not participate.

Little or no association was found between response to the X-ray survey and health status, education, sex, race, or social welfare status.

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*Tabulations omitted from this report are available from the authors.*

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