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EFFECTS OF AIRCRAFT NOISE ON THE EQUILIBRIUM
OF AIRPORT RESIDENTS: TESTING AND UTILIZATION
OF A NEW METHODOLOGY

Jacques Francois

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avions sur l'equilibre des riverains des
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16. Abstract This is a follow-up study to investigate problems of noise around airports. The focus of the investigation is centered around two main themes: 1) Analysis of the effects of aircraft noise on the psychological and physiological equilibrium of airport residents 2) Analysis of the sources of variability of sensitivity to noise. The methodology used is presented. Nine statistical tables are included, with a rather lengthy set of conclusions.			
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In conformity with contract No. 76 02 010 00 237 75 01 established within the framework of the "social cost of noise" Operation (Operation No. 56 00 76 000 58), IFOP was asked to carry out an investigation of the effects of aircraft noise on the equilibrium of airport residents. This consists of designing and testing a new method which provides medical check-ups and laboratory analyses of the people studied.

This research is conducted by IFOP in close collaboration with l'Equipe de Biométrie Humaine of the C.N.R.S. which is responsible for the medical and biological aspects of the study.

The method was tested in June 1976 on a sampling of 150 individuals distributed in three survey zones (Paris 17, Dourdan, Athis Mons).

When this test was completed, two preliminary reports were presented to the Comité Scientifique Bruit et Vibrations (Vibrations and Noise Science Committee):

- .one IFOP report in September 1976,
- .one EBH report in October 1976.

With the consent of the Comité Bruit et Vibrations, the results of this test and the information it provided were analyzed and drafted in the present document.

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EFFECTS OF AIRCRAFT NOISE ON THE EQUILIBRIUM OF AIRPORT RESIDENTS:
TESTING AND UTILIZATION OF A NEW METHODOLOGY

By
J. François*

I. RESEARCH OBJECTIVES AND PROCEDURE. DEVELOPMENT OF THE
PILOT PHASE

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A. RESEARCH OBJECTIVES

This project is a follow-up study carried out by IFOP on the equilibrium of airport residents in 1974-1975 at the request of the Comité Bruit et Vibrations of the Ministère de la Qualité de la Vie (Noise and Vibrations Committee of the Quality of Life Ministry). The aim of this new research phase is to expand the results and the scope of the investigation.

The focus of the investigation is centered around two main themes:

a. Analysis of the Effects of Aircraft Noise on the Psychological and Physiological Equilibrium of Airport Residents

We have taken as working assumption that if environmental conditions affect a person's health, then we should be able to detect variations of certain biological or psychological parameters as a function of different environmental conditions.

An unfavorable environment causes abnormalities or deviations from normal behavior (whether precursors or not of pathological disorders) in a group of individuals who obviously have higher tolerance thresholds than individuals who develop pathological disorders in the same environmental conditions.

In the first study, the investigation of the effects of noise on the physical and mental health of airport residents was conducted with personality tests and a health questionnaire.

*This report was prepared by the author for the Noise and Vibrations Science Committee of the Ministry of Culture and Environment.

**Numbers in the margin indicate pagination in the original foreign text.

Personality tests are still the most reliable tool of /2
measuring the mental health of a group of people and there is
no reason for questioning their use.

Answers collected from a self-administered health question-
naire, however, are inevitably inaccurate and "infra-pathological"
phenomena are difficult to identify in them.

Such a means of investigation was warranted for the earlier
pilot study because it is easy to administer. The study of the
relationship between environment and health, however, will provide
decisive information: in addition to health questionnaires, the
people can be given a medical check-up along with blood and urine
tests. The present research program is based on this approach.

b. Analysis of the Sources of Variability of Sensitivity to Noise

We know that this variability is important and we were able to
show that people who are the most annoyed by noise are on the aver-
age more tense and neurotic (1) than others.

If the study accounts for both physiological parameters and per-
sonality factors, an investigation of their correlation and their
relationship to annoyance will give us a better understanding of
annoyance variations (2).

B. INITIAL METHODOLOGY CONCEIVED

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The project focusses on the investigation of Orly residents
living in the noisiest zones.

Since it is not possible to form a perfectly comparable test

-
- (1) - We are referring here to neurosis and anxiety measured by
personality tests.
 - (2) - We know that the studies of annoyance from noise conducted in
various countries encounter the problem of inter-individual
variability. We believe this is because personality factors
and biological factors should have been given more consideration.

group differing from Orly residents by only one variable, we will refer to two contrasting test groups:

- .residents of Paris,
- .residents of small cities around Paris.

In these three groups, we will study people between the ages of 20 and 65 years.

Information will be gathered from interviews conducted in the home and from physical check-ups given in a clinic.

For each of the three groups studied, it will be necessary to obtain permission from several clinics in the area where the interviews will be conducted.

In the area served by the clinic, a "cluster" of interviews will make it possible to record:

- .from a questionnaire given orally: attitudes toward the environment, particularly ambient noise, and information about life-styles.
- .from a self-administered questionnaire: (completed in front of the investigator): answers to personality tests and a first series of questions on health.

At the end of the conversation, the interviewer will invite the interviewee to appear at the clinic for a free medical check-up. The check-up will include:

- .a more detailed health questionnaire,
- .recording weight, height and blood pressure,
- .an electromyogram,
- .a blood test.

After this examination, the subjects will be asked to bring

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back a urine specimen within 24 hours.

The following assumptions were formulated for the sample groups during the elaboration of the research project.

FOR EACH OF THE THREE POPULATION GROUPS, INTERVIEWS WILL BE GIVEN TO 600 PEOPLE DISTRIBUTED AROUND 4 SURVEY POINTS (CLINICS). IT IS EXPECTED THAT 150 TO 200 OF THESE SUBJECTS WILL APPEAR FOR THE MEDICAL CHECK-UP. THIS GIVES A TOTAL OF 1,800 PEOPLE WHO WILL BE INTERVIEWED OF WHICH 450 TO 600 WILL PROVIDE ALL INFORMATION REQUESTED.

C. DEVELOPMENT OF THE PILOT PHASE

Before initiating the main research programme, a pilot survey was conducted to test the methodology.

This pilot survey had two main objectives:

.to examine the practical aspects of the research:

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to check whether clinics will be available; to work out survey procedures ensuring the best possible interfacing between a team of interviewers and a medical team; to solve material problems arising from the implementation of a mobile medical service; to determine the approximate percentage of people who will accept to appear at the clinic for a physical check-up so that appropriate reception and medical teams can be arranged in advance, etc.

.to check the validity of the procedure:

the scheme of methodology assumes that the three sample groups receiving medical check-ups are characteristic of the people they represent for the points being investigated. The type and extent of biased information could be checked owing to the voluntary nature of the answers given.

The pilot phase should also include the testing of the questionnaires and data recording protocols.

To study these different points, a survey composed of a "reduced model" was conducted. The latter provided the execution of 12 series of 150 interviews (4 groups for each of the 3 population groups studied). Three groups of 50 cases were tested per population group.

The survey was carried out at the following times and places:

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.PARIS XVII: interviews on Tuesday, June 1 to Friday, June 4.
Medical examinations from Tuesday June 8 to Monday June 14.

.DOURDAN: interviews from Tuesday June 8 to Thursday June 10.
Medical check-ups from Wednesday June 17 to Monday June 21.

.ATHIS MONS: interviews from Monday June 16 to Saturday June 19.
Medical check-ups from Thursday June 24 to Tuesday June 29.

The interviewers (in numbers of 3 or 4) conducted their interviews near the clinic according to the method of quotas. Each interviewer worked a given sector at a walking distance of 5 to 10 minutes from the clinic.

The survey was presented as a study on the life-style of French people to avoid distorted answers arising when people refuse to participate in the interview because of the real subject.

After completing the written questionnaire and answering questions to the oral questionnaire, the investigators invited the subjects to participate in a free physical check-up. Those being treated for a serious heart disorder, a recent case of hepatitis

or with anti-coagulants were excluded from the sampling.

To encourage people to accept the medical examination, the IFOP interviewer pointed out that the investigation was being conducted by the Minister of the Quality of Life and by C.N.R.S. and showed a letter of confirmation with a seal from the Ministry. He was also ready to give working people an authorized excuse from work, but this document was rarely used.

Finally, if the individual being interviewed accepted to take /7 the medical examination, he was given a card of preliminary instructions and was asked to indicate three possible appointments for the following week. These appointments were recorded on a card which included the individual's name, address and identification number. The interview lasted about one hour.

A coordinator collected all of the appointment cards each day and made final appointments by considering both the interviewee's requests and available appointment times. Each interviewee was then sent a letter specifying the day and time of the appointment.

After about one week, the medical team gathered volunteers. The team consisted of a doctor, a pharmacist and two technicians from the Equipe de Biométrie Humaine (E.B.H.) (Human Biometry Team) of C.N.R.S. (1) Medical examinations were given mornings only, due to blood test requirements.

The medical team gave the check-ups which were scheduled, had the volunteers fill in a health questionnaire and then offered breakfast. The check-up lasted about one hour and twenty minutes.

At the end of the check-up, the volunteers were asked to bring back a urine specimen within 24 hours. Those who accepted were

(1) The medical team created for this survey was placed under the scientific authority of EBH who signed a contract with the Ministry of the Quality of Life for the present research project.

given a bottle and an instruction card. The urine specimens were taken at the clinic by volunteers, or at home. A 24-hour urine specimen being sometimes hard to provide, the volunteers were given the possibility of doing this during the week-end.

II - TEST RESULTS AND INFORMATION

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A. FEASIBILITY OF THE INVESTIGATION ON THE PRACTICAL LEVEL

In terms of "feasibility", the pilot survey on the whole was carried out as planned. The questionnaires, and protocol the survey procedures and the establishment of a mobile medical team did not present any special problem. All points will be modified to some extent, but the general programme outline will not be intrinsically changed.

The initial project was established with the assumption that about 33% of the people would accept the medical check-up. This assumption was perfectly justified, since 32% of the people interviewed accepted to undergo the medical check-up. Owing to an information loss at each phase, however, the percentage of "complete cases", i.e. those for which there is information on the oral and written interviews and on the medical check-up, lowered to 24%. This rate drops to 19% if the 24 hour urine specimen requirement is considered.

These results, shown in the table below, are quite satisfactory, even though they are lower than expected. Volunteers were selected at random and their only motivation was to find out the results of their check-up, and in some cases, to contribute to scientific research.

Given this perspective, we can consider that 24% of the "complete cases" is a high percentage which would be difficult to improve.

	Number of Interviews	Discarded for medical reasons (1)	Refused check-up	Accepted check-up	Appeared for check-up	Accepted urine test	Urine specimens incomplete	Complete
PARIS XVII	50	3	27	20	(2) 15	14	2	12
DOURDAN	50	3	33	14	13	12	2	10
ATHIS MONS	50	0	36	14	8	8	1	6
T O T A L	150	6	96	48	36	34	5	28
%	100	4	64	32	24	23	3	19

(1) - including: 3 hepatitis cases, 1 anti-coagulant infarct, 1 endocarditis (Osler disorder), 1 sub-anticoagulant.

(2) - including: 2 who reappeared after missing the first appointment.

In a first analysis, this rate of 24% is high enough to continue the investigation.

In practice, the main difficulties stem from the medical check-ups which are a "bottle-neck" to the progress of the investigation. Indeed, if we vary the number of interviewers, we can easily increase or decrease the recruitment of volunteers, concentrate them or spread them out in time. The only restriction in this regard lies in the size of the population living near the clinic, which could possibly limit the number of interviews given at a given point.

On the other hand, the medical check-ups are a determining factor in the research planning.

If we stick to the programme tested - which would include an audiometric examination as requested by the Noise and Vibrations Committee - the capability of accomodating the medical team is limited by several factors:

- .the length of the medical check-up: we can expect that it will take on the average one hour and twenty minutes to one hour and twenty five minutes, including the audiometric examination,
- .the requirement of performing the check-ups in the morning only, because of the blood tests,
- .the limited staff of the medical Team and the relatively limited space in the clinics.

If we keep the testing procedure on the basis of a 24% acceptance rate, we can estimate (1) that it will be necessary:

- . to add another person to the medical Team which shall include a total of four persons working outside
- . to double the duration of information collection, which will change from 3 to 6 months

(1) - See preliminary report (IFOP, Sept. 1976).

However, a careful examination of the people who appeared for the medical check-up leads us to recommend intrinsic changes in the research plan. Indeed, if the approach we have tested allows us to recruit a large number of volunteers and to perform medical check-ups under satisfactory scientific conditions, it nevertheless causes distortions to appear in the sample which are likely to make us question the validity of the research results.

Moreover, the execution of the survey depends on the collaboration of the clinics: the medical examinations will be performed in quarters placed at our disposal by the clinics, since we were not able to set up a mobile unit for financial reasons.

The pilot survey was well received by the contacted clinics. There is little need for concern on their part if the project is presented in an appropriate manner (i.e. emphasizing the public interest in a medical science research project). Problems which may arise stem from the limited space available and from the possible addition of an audiometric mobile unit. A long-term installation of the medical team in each clinic is also likely to create problems.

E. VALIDITY OF THE APPROACH

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Any research project based on a sampling of volunteers necessarily includes biased information: no matter what technique is adopted or which precautions are taken, it is almost impossible to state that the sampling used for a test is validly representative of the whole population group studied. In most cases, not only does the sampling of volunteers contain biased information, but it is also not possible to evaluate the characteristics and extent of this biased information, nor its effects on the results.

These factors have rarely stopped researchers: in all disciplines of the human or biological sciences, very numerous studies have been conducted on the basis of volunteers and it is

not rare to see results extrapolated on the basis of a small sampling of voluntary students. This approach is undoubtedly legitimate in many cases. Laboratory research conducted to study a perceptive threshold or the effect of medication undoubtedly gives valid results if certain precautions are taken: criteria used to select the volunteers and the reasons for their accepting the experiment should be independent from the subject studied.

We have to be more rigorous for the research project we are planning to conduct. It is an epidemiological type research project conducted to describe and to compare population groups by using representative samplings. The procedure adopted is quite different than the traditional experimental procedure. We are not attempting to form groups and to expose them to the effects of one or several variables.

In our study, the variables are separated only for sampling /13 and the volunteer groups do not come to be involved in an experiment, but to be observed, and analyzed to permit an extrapolation of the entire population group they represent.

Under these conditions, we should approach the ideal plan as far as possible: to obtain the participation of any individual contacted randomly.

While establishing the research project, we have taken this strict imperative into account and we have concluded that we could overcome the objections about biased information coming from voluntary information for two reasons:

.the methodology adopted makes it possible to evaluate the magnitude of the biased information and to take this into account during the analysis and interpretation of the results. Thanks to questionnaires administered to the whole sample group during the first contact, we can actually compare the profile of individuals

who appear for the check-up with that of individuals who refuse to appear or cannot appear.

.we could make the assumption that the biased information would be the same qualitatively and quantitatively in the three sample groups, such that any distorted information would not prevent comparisons to be made.

These arguments are acceptable under two conditions:

.there can only be little biased information so that an evaluation of "the absolute value" of the results of each population group studied can be made.

.biased information must not be related to the research themes.

These methodological considerations have led us to continue the /14 analysis of results of the pilot survey so that we may have more information about the characteristics and extent of the distorted answers given by volunteers.

1. SOCIO-DEMOGRAPHIC CHARACTERISTICS

Volunteers give fairly distorted answers at the level of the socio-demographic characteristics of the sample: motivations of the interviewed individuals and undoubtedly their availability do not give each category the same probability of participating in the medical check-up.

The tables shown on pages 13 and 14 give significant factors of bias for a series of criteria:

.sex: men appear for medical check-ups less often than women.

.age: on the whole, the rate of participation is higher among young age groups: 31% for individuals under 40 years old compared to

20% for individuals between 40 to 65 years old.

It is possible that the relationship between the participation rate in the medical check-up and age is more complex: the participation rate, which is low for individuals younger than 25 years old is expected to be higher in the 25 to 39 age group, and then should decline. However, the limited number of interviews given in the different age groups cannot give characteristic information about this observation.

.the family situation: single people rarely appear for medical check-ups. This explains the low participation rate for the age group of twenty five years old and younger.

Volunteers usually are married and come from large families: the participation rate increases with the number of family members in the home and the number of children.

.the socio-economic level: contrary to what we would think, people from the sample group participating in medical check-ups form a percentage of workers which is comparable to that of the basic sampling group.

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Conversely, the probability of appearing at the clinics increases with the socio-economic level. This phenomenon is obvious when we consider the profession of the interviewees, and - is even more obvious, given the larger number of women volunteers - when we consider the profession of the husband or wife. We may consider that people from affluent circles are more aware of the value of good health, and besides, it is easier for them to get away for a morning. The higher participation rate does not apply to individuals with a higher education: higher social classes, and/or the most available social classes have a technical or commercial training and are recruited from free-lance workers, business professionals or individuals active in the crafts.

Compared to the sample group interviewed at home, the group which participated in medical check-ups, therefore, forms a

	Appeared for check- up	Did not appear	Entire sample group	Rate of participation
Base.....	36	114	150	
	%	%	%	%
<u>SEX</u>				
.Men.....	39	53	49	19
.Women.....	61	47	51	29
	<u>100</u>	<u>100</u>	<u>100</u>	
<u>AGE</u>				
.Under 25 years....	8	18	16	13 } 31
.25 to 39 years....	47	23	29	40 } 20
.40 to 49 years....	11	28	24	11 } 20
.50 to 54 years....	34	31	31	26 } 20
	<u>100</u>	<u>100</u>	<u>100</u>	
<u>CIVIL STATUS</u>				
.Single.....	6	21	17	8
.Married.....	89	72	76	29
.Widow(er), div...	5	5	6	25
.No answer.....	-	2	1	-
	<u>100</u>	<u>100</u>	<u>100</u>	
.Head of household.	36	50	47	19
.Housewife.....	56	34	39	35
.Neither.....	8	16	14	13
	<u>100</u>	<u>100</u>	<u>100</u>	
<u>NUMBER IN THE HOME</u>				
.1.....	8	8	8	25
.2.....	22	35	32	17
.3.....	25	24	24	26
.4.....	20	19	19	25
.5 & more.....	25	14	17	38
	<u>100</u>	<u>100</u>	<u>100</u>	
<u>NUMBER OF CHILDREN</u>				
.None.....	17	46	39	11
.1.....	28	23	24	29
.2.....	22	16	18	31
.3 & more.....	33	15	19	43
	<u>100</u>	<u>100</u>	<u>100</u>	

	Appeared for check- up	Did not appear	Entire sample group	Rate of partici- pation
Base.....	30 %	114 %	150 %	%
<u>EDUCATIONAL LEVEL</u>				
.Primary.....	42,0	35	36	27
.Secondary.....	16,5	25	23	17
.Technical, comm.....	16,5	9	11	37
.University.....	25,0	31	30	20
	<hr/> 100,0	<hr/> 100	<hr/> 100	<hr/> 100
<u>PROFESSIONAL STATUS</u>				
.Higher executive (industry, business)	19	16	17	28
.Lower executive, employee.....	25	23	23	26
.Worker.....	11	17	16	17
.Nonworker.....	45	43	43	25
.No answer.....	-	1	1	-
	<hr/> 100	<hr/> 100	<hr/> 100	
<u>PROFESSIONAL STATUS OF HUSBAND OR WIFE</u>				
.Higher executive....	36	17	22	41
.Lower executive, employee.....	22	15	16	33
.Worker.....	14	13	13	26
.Nonworker.....	17	33	30	14
.No answer.....	11	22	19	14
	<hr/> 100	<hr/> 100	<hr/> 100	
<u>MONTHLY INCOME (TOTAL)</u>				
.Less than 2500 F ...	6	12	10	13
.2500 to 2999 F.....	22	20	21	27
.4000 to 6499 F.....	25	27	27	23
.6500 F or more.....	33	26	28	29
.No answer.....	14	15	14	24
	<hr/> 100	<hr/> 100	<hr/> 100	

a biased sub-group for all essential socio-demographic criteria.

These biases are not necessarily unsurmountable handicaps for the research project under consideration: if the meaning and extent of the biases are known, then the sampling plan can counterbalance the effects in each survey zone. It is important that these biases are not based on deeper biases: since men tend to participate in medical check-ups less frequently than women, the sampling plan can compensate this fact by planning for more interviews among men than among women. This solution is valid only if the men who do appear for medical check-ups are representative of all men interviewed, particularly for the essential criteria relating to the subject of this project.

2. PERSONAL FACTORS

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To evaluate the possible psychological differences or differences in basic character between the group who participated in medical check-ups and the remaining sample group, we have three series of data:

- .the MINIMULT personality test which measures 8 personality factors (1),
- .a series of twelve questions asked orally at the beginning of the interview,
- .a series of written questions concerning subjective symptoms, such as a nervous predisposition,

The MINIMULT test does not bring to light any significant difference between the two groups (see the table on the following page). We were able to assume that the volunteers were expected to be recruited more often among people with special personality traits, such as having higher hypochondria tendencies than the average, or lower paranoiac inclinations than the average, etc. It seems that these assumptions should be discarded.

Conversely, "superficial" differences in character may be brought to light. For four items of the written questionnaire, significant

(1) MINIMULT is a small-scale version of the MMPI, adapted and calibrated in France by Mr. PERSE and edited by the Editions du Centre de Psychologie Appliquée.

	Appeared for check- up	Did not appear	Entire sample group
.Value of each group.....	36	114	150
-Hypochondria (Hs)..... m	53,2	52,3	52,6
-Depression (D)..... σ	10,6	12,1	11,7
-Depression (D)..... m	49,5	50,1	49,9
..... σ	10,1	11,5	11,1
-Hysteria (Hy)..... m	52,3	53,4	53,1
..... σ	10,7	11,5	11,3
-Psychopathic deviation m	48,5	52,1	51,1
-Pd)..... σ	9,7	11,5	11,1
-Paranoia (Pa)..... m	48,3	48,4	48,4
..... σ	9,6	9,6	9,6
-Neurasthenia..... m	48,5	49,4	49,1
..... σ	11,1	11,7	11,6
-Hypomania (Ma)..... m	51,0	53,2	52,6
..... σ	10,6	12,3	12,0
m	51,8	54,9	54,1
σ	9,5	9,0	9,3

	Appeared for check-up	Did not appear	Entire sample group
	%	%	%
.They sometimes felt irritable, irascible, ready to explode for small reasons.....	81	66	70
.They sometimes felt an exces- sive emotion.....	81	65	69
.They sometimes felt frightful	78	60	64
.They sometimes felt a lump in the throat.....	39	20	25

differences of .05 or .10 (2) were noted.

Hence, volunteers are more emotional and more tense than non-volunteers.

In short, the use of volunteers does not seem to introduce heavy biases for the various psychological variables we are considering. Actually, acceptance of the medical check-up is much less related to personality traits than to health; volunteers are recruited less frequently from "hypochondriacs" than from sick or unhealthy individuals. Accordingly, there are large distortions on the health questionnaire which are analyzed in the report by the Equipe de Biométrie Humaine.

The next table summarizes these observations.

- (2) It seems valid to consider large differences at the threshold of .10, because we are not attempting to demonstrate the existence of biases, but to estimate the probability of their occurrence in the survey under consideration.

	Appeared for check-up	Did not appear	Entire sample group
	%	%	%
<u>.General health over the past 12 months:</u>			
-Good.....	39	48	46
-Fairly good.....	58	39	43
-Poor.....	3	9	7
-Other.....	-	2	2
-No answer.....	-	2	2
	<u>100</u>	<u>100</u>	<u>100</u>
.Stopped working for health reasons during the past 12 months	44	20	26
.Hospitalization during the past 12 months.....	22	10	13
.Stated having chronic illness...	36	8	15
.Stated feeling pains in some part of the body.....	36	26	28

3. ATTITUDES TOWARD NOISE

Due to the theme of the investigation, it is important that the acceptance or refusal to appear for the medical check-up is not related to attitudes toward noise. Moreover, some indices seem to show that this is not the case.

Certainly, the self-evaluation of sensitivity to noise does not lead to the distinction of two groups.

When we consider "objective" manifestations of annoyance from noise, there is also no distinction between volunteers and non-volunteers.

	Appeared for check- up	Did not appear	Entire sample group
	%	%	%
<u>.Compared to others, they consider themselves:</u>			
-More sensitive to noise..	20	26	24
-As sensitive to noise....	36	33	34
-Less sensitive to noise..	27	26	26
-No opinion.....	-	1	1
-Do not hear noise.....	17	14	15
	<hr/> 100	<hr/> 100	<hr/> 100
<u>.Due to aircraft noise, they are frequently or sometimes:</u>			
-Prevented from sleeping...	44	43	43
-Awakened from sleep.....	42	39	40
-Bothered during conversations.	25	22	23
-Bothered while listening to TV or the radio.....	28	26	26
-Prevented from opening window.	33	28	29
-Frightened.....	3	3	3

It is also noted that individuals who are very frequently annoyed by noise did not appear for the medical check-up. As a matter of fact, even if they indicate in similar percentages the various "objective" inconveniences caused by noise, the volunteers complain less often of the "subjective" aspects of the annoyance.

	Appeared for check- up	Did not appear	Entire sample group
<u>.Are annoyed by noise</u>	%	%	%
-Very often.....	-	9	7
-Fairly often.....	33	20	23
-Sometimes.....	31	36	35
-Never.....	36	35	35
	<hr/> 100	<hr/> 100	<hr/> 100
<u>.Noise causes them to be frequently or fairly often:</u>			
-Unnerved.....	17	29	26
-Unable to concentrate....	17	28	25
-Fatigued.....	11	26	23
-Anguished.....	8	5	6

CONCLUSIONS

/24

Testing of the methodological procedure has shown that it results in fairly high rates of participation (24%) in medical check-ups and in satisfactory conditions for the execution of the check-ups and the blood and urine tests. The use of volunteers, introduces biased information in the results and due to their large numbers, these distortions are incompatible with some of the research objectives.

In the initial project, the information gathered should make it possible to perform three types of analysis, and in particular:

- ① - to find an absolute value for the different psychological and biological variables in order to extrapolate the results for the

three population groups and to perform a "diagnosis" on ORLY residents.

②-to perform a comparative analysis of the three sample groups, by examining the ORLY sample group and contrasting it to the two test sample groups.

③-to analyze the correlation between psychobiological variables and the declared annoyance.

We may outline procedures which aim to decrease distortions occurring in voluntary answers (see infra). These modifications will eliminate biases of socio-demographic characteristics. Conversely, important biases about health may not be significantly reduced.

With this situation, we may not perform analyses of type ①: /25 the samplings will not be characteristic of the people they are supposed to represent and it will not be possible to give "an absolute value" to the original population group.

The scope of the research objectives should therefore be reduced. Two solutions seem possible to us, but neither of them is perfectly satisfactory.

1st Assumption: Keep Objectives ② and ③

We thus keep the general research scheme and incorporate the modifications in procedure specified below.

This will consists of comparing the ORLY sampling with the two test groups, knowing that the three sample groups will include an abnormally high percentage of people with health problems.

Under this assumption, two main problems will remain regarding the interpretation of results:

.the analysis of biological data collected from groups containing large numbers of relatively pathological cases may be rather delicate (1). This analysis will become even more complex, because this number will vary from one sample group to another. These 3 groups cannot be matched in terms of health criteria, because it is precisely these criteria which form the basis of comparison between these groups.

.possible differences observed between the 3 groups for psychological and biological variables will be interpreted in terms of environmental conditions (and particularly ambient noise), which vary from one group to the other: ORLY residents will be compared to the other two test groups (Parisians and inhabitants of small cities). Such an interpretation will be valid only if the rate of voluntary answers and the sampling distortions do not differ quantitatively or qualitatively within the 3 groups under investigation (2).

/26

If this were not the case, it would be quite awkward to give this research project a demonstrative importance and to draw clear and valid conclusions from it. To a certain extent, this method of procedure is, therefore, based on a "bet" that we are not sure to win.

-2nd Assumption: Keep Objective 3 Only

This consists of studying the correlation between the psychological and biological variables on the one hand and the annoyance caused by ambient noise on the other hand.

This second assumption presents the advantage of leading to clear conclusions, but it implies leaving out the first objective of the research: analysis of the possible effects of ambient noise.

-
- (1) Refer to this subject in the report provided by the Equipe de Biométrie Humaine.
 - (2) We will have an indication of this phenomenon by comparing the answers given by volunteers and nonvolunteers to the self-administrated questionnaire.

The investigation should be centered around the study of hypersensitivity or hyposensitivity effects of ambient noise. It could be conducted by following the scheme : in a zone where noise is annoying, but not intolerable, for example, in zone C aroundn ORLY, we would study through questionnaires, medical check-ups and samplings three population groups who are highly annoyed by noise, somewhat annoyed by noise and annoyed by noise very little or not at all.

Since ambient noise is similar for these three groups, we may establish a correlation between the psychological and biological variables with annoyance (considered as analysis critiera or as continuous variable).

Compared to the first assumption considered, this one seems preferable because it is more "direct" and demonstrative. However, it is also confronted with the problems of analysis pointed out above: problem of interpreting the biological data of samples that include a high percentage of people in poor health; necessity of identical quantitative and qualitative biases in the 3 groups under study (defined by the annoyance level).

MODIFICATIONS OF THE SURVEY PROCEDURES

/27

For either solution adopted, we will apply a set of modifications to the data collection procedure for two reasons:

- .to match the samples,
- .to reduce biases.

1. MATCHING THE SAMPLES

The psychological and biological variables are more or less highly related to various socio-demographic characteristics.

Sex and age of the subjects, in particular, have a determining weight on numerous psychological parameters (see the report

provided by the Equipe de Biométrie Humaine). It is quite important to match the groups as closely as possible if they are to be compared.

The samples may be matched by recruiting the volunteers at a slow pace, thus allowing for appropriate adjustments to be made. At the beginning, quotas given to the interviewer will aim to counterbalance the biases already known. They will question more men than women if we want to see an equal number of men and women appear for the medical check-up, etc.

The characteristics of the people coming to the clinic will be logged as they show up in order to process, day by day, the quotas given to the investigators.

This method will make it possible to obtain closely matched samples, based on different socio-demographic characteristics. This will require a considerable extension in the data collection phase, since it is quite different from the initial procedure which aimed to perform the maximum number of medical check-ups in the shortest possible time.

2. INCREASING THE PARTICIPATION RATE AND DECREASING BIASES CONCERNING HEALTH

/28

Distorsions concerning demographic criteria will have been discarded by applying the method of continuous matching. Biases relating to health will remain, as they cannot be eliminated with the same method.

The three groups are not matched according to their health status, because we are precisely trying to bring to light the possible differences.

Indeed, each group, volunteers and nonvolunteers, should have the same psychophysiological characteristics. Moreover, it will not be possible to match volunteers and nonvolunteers in terms

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Table on Reasons for Refusals

Among the 100 Reasons Given to Explain the Refusal:

	%
-Lack of time, unable to get away for physical.....	25
-Followed regularly by doctor.....	20
-Not useful.....	14
-Already had a physical recently.....	8
-Going on a trip.....	8
-In good health.....	8
-These check-ups are not complete enough.....	6
-Checked by doctor at work.....	4
-Refuses blood test.....	3
-Other reasons.....	<u>4</u>
	100

.the physical check-up will be presented second, i.e. the inter-
viewed individual will be told that this research project will
provide invaluable information. A second "argument" will be
developed by the investigator by placing emphasis on the effect
the check-up will have on the individual's health and on the
comprehensive nature of the check-ups conducted which will include
laboratory analyses not normally performed.

By presenting the survey in these terms, we should be able
to drop the number of refusals of people who do not see any reason
for having a check-up, who think they are in good health, and who
think these physicals are not complete enough.

b) Relaxing the Constraints

During the pilot survey, people were asked to appear at the
clinic one morning during the week following the interview. A
series of refusals resulted from those who could not get away that
week and particularly from those who could not be free for a good
part of the morning.

By extending the data collection phase, it will be easier for individuals to find a day and an hour which fit in their schedule; this will be even easier if physical check-ups are available the whole day.

The blood test has to be taken in the morning, and during the pilot survey it was administered at the clinic at the same time as the physical check-ups. We may consider taking the blood test at home: shortly after the initial interviews, the doctor could make morning rounds to take blood tests and at the same time, he could leave a specimen container for the 24 hour urine test. The subjects would then bring the container when appearing for the physical check-up (where they will be told their blood test results).

These physical check-ups could take place all day (until 7 or 8 p.m.), giving everyone an opportunity to appear, regardless of obligations.

Furthermore, a systematic follow-up should reduce the number of individuals who accept the physical check-up during the recruiting interview, but who do not show up at the clinic (they represent 8% of the people interviewed during the pilot survey).

It would undoubtedly of interest to reexamine the possibility of using a mobile unit for the physical check-ups. /32

The mobile unit would present some advantages:

- .it would provide greater proximity to the recruited individuals and would emphasize the importance of the investigation and should increase the rate of participation.
- .the survey points would not have to be chosen on the basis of the location of clinics,
- .the work of the medical team would no longer be restricted by the constraints imposed by each clinic (hours, available space, arrangement of rooms, etc.).

In summary, these changes will undoubtedly increase the rate of participation and decrease the biases relating to health, although we cannot give a precise estimate of these improvements.

MEANS TO BE IMPLEMENTED

/33

The survey under consideration will require relatively large means in equipment for check-ups, in medical personnel for laboratory analyses. The groundwork will be long: 6 months to one year.

The weight of this investigation will be felt at the level of the physical check-ups and laboratory analyses. This work, according to the initial project, will be under the direction of Mr. J.G. HENROTTE of the Equipe de Biométrie Humaine of the C.N.R.S. His report presents the problems or obstacles the Equipe (Team) must face during the execution of this research project.

The action of IFOP, while leaving the scope of its usual activities, does not seem to encounter many problems: a small team of investigators will be formed under an advisor working full-time for this research project. This advisor will mainly be responsible for coordinating the activities of this team with the medical team for making appointments and for carefully matching the samples.

If we assume that the problems arising during the execution of the biological aspects of this investigation would prove to be impossible to overcome because of practical and financial obstacles, another methodology could be considered. This would consist of conducting a survey similar to that carried out by IFOP around ORLY and Roissy in 1974-1975. Data would be collected using a confidential self-administered questionnaire which is more detailed than the one used in the previous survey.

The Equipe de Biométrie Humaine would assist in the preparation /34 of this questionnaire and in logging and analyzing the results.

Such a method would not provide as rich and demonstrative results as a study using biological analyses. It would still enable a more detailed analysis of the effects of ambient noise on airport residents to be made and would provide a study of correlations between annoyance and personality factors and health. Furthermore, a survey by questionnaire would not present the problems of biases which were encountered with the study using biological analyses.