

INVESTIGATION OF INDIVIDUAL RADIATION EXPOSURES: COMPARATIVE USE OF INTERVIEW AND LOGGING TECHNIQUES IN HABITS SURVEYS OF THE CUMBRIAN COASTAL FISHING COMMUNITY

D. R. P. Leonard

Ministry of Agriculture, Fisheries and Food, Directorate of Fisheries Research,
Fisheries Laboratory, Lowestoft, Suffolk, UK

INTRODUCTION

The International Commission on Radiological Protection (ICRP) recommends the selection of appropriate critical groups as a basis for the assessment of dose to individual members of the public. This procedure is used by the MAFF Directorate of Fisheries Research in the assessment of individual exposure from discharges of radioactivity into the marine environment. Surveys of people's habits and consumption rates provide the basic data for the selection and combination of these critical groups, and are directed towards those who are likely to be the most highly exposed. Usually, quantitative information is derived from talking to fishermen, their families, friends and customers. Verification of this information is important, especially for the more significant exposure pathways. To enable such a verification an alternative method was devised, based on individuals weighing and recording details of their consumption of seafood, a technique known as a logging or diary study. This paper describes a comparison of the interview and logging techniques for two important pathways those via fish consumption and via mollusc consumption by the fishing community in West Cumbria, near the British Nuclear Fuels Limited (BNFL) Sellafield works.

METHODS

The two information collection techniques were applied to a common group of consumers.

Interview Technique

Consumers in the West Cumbrian fishing community who had previously been identified as critical group members⁽¹⁾ were revisited. Following our standard procedure⁽²⁾, each person was asked to estimate the quantities of all sea-food eaten during the preceding twelve months. Factors of particular importance were the source of supply, seasonal availability and method of preparation as well as frequency of consumption and weight of individual portions. Wherever possible sample portions were weighed during the interview or an estimate was made with the aid of photographs. Each interview would typically last an hour, providing data on not only the critical group consumer but also their families. This method primarily relies on the skill of the interviewer in terms of judgement and interpretation; thus people's memories sometimes had to be guided to giving a representative account of their regular consumption rather than what that person could eat if a species were available ad libitum. Formal questionnaires were not used as they offer too rigid a format. Instead, the conversation concentrated on the most significant pathways, namely consumption of fish, crustaceans and molluscs. Sources of supply were divided into (a) within 15 km of the Sellafield pipeline (b) outside the pipeline area, but still within the northern Irish Sea and (c) convenience seafoods. A species list was also used to check that the person had not omitted to mention some species which were only eaten very occasionally. The data obtained were reduced using our standard procedure⁽²⁾.

Logging Technique

After the interview, the cooperation of a representative of the household was requested in recording all the seafood eaten for a two-week period during each

quarter for the next calendar year. The logging study covered 12 people out of the original 21 people who had constituted the two critical groups⁽¹⁾. Each household recorded the weight of seafood portions just before cooking, with comments such as how much was eaten by each person, source of supply etc. Records were kept of all seafood eaten including shop-bought wet and convenience products. Regular visits were made to participants' homes during the survey; people were asked to comment on what they had written down compared with what they had stated at the interview. In addition, people were asked to complete a questionnaire asking whether the consumption rates recorded during the two weeks were considered typical for that quarter. Examples of factors affecting the results given were illness, availability of species, weather conditions, engine breakdown, adverse tidal conditions and periods of absence. However, the majority of people thought their consumption pattern was typical of that quarter; thus the data have been extrapolated linearly.

The log records were analysed to tabulate individual edible flesh weights for the different species eaten by each consumer and to convert the data to consumption rates for each logging period for fish, crustaceans and molluscs coming from the same three sources as in the interview survey.

RESULTS

Due to limitations of space, only the results for fish and molluscs within 15 km of Sellafield are presented here.

In comparing results from the two techniques it is to be noted that the periods to which the interview and logging studies apply are different. Thus there are two variables to consider, a genuine change in people's habits and a possible difference between the two survey methods. Precautions were taken to detect any changes in habits, the problem being discussed with the consumers during the logging period; it is thus considered that a valid comparison can be made.

Table 1 Consumption rates (g d^{-1}) of fish and molluscs caught within 15 km of Sellafield as obtained during quarterly logging compared with those from interviews

Observation number	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Mean	Interview
<u>Fish consumers</u>						
1	0.0	78.1	96.0	30.2	51.1	54.0
2	0.0	113.3	128.9	NR	60.6	61.6
3	28.4	24.3	58.7	46.9	40.3	34.9
4	0.0	194.5	68.2	81.9	86.2	155.5
5	48.6	20.3	54.3	77.0	50.1	34.9
<u>Mollusc consumers</u>						
6	10.3	12.1	18.2	10.1	12.7	10.4
7	0.0	0.0	32.4	12.1	11.1	5.2
8	10.3	0.0	10.1	8.1	7.1	5.2
9	10.3	26.7	0.0	6.1	10.8	5.2
10	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0	0.0	0.0

NR = No return: mean estimated on basis of statement that fish eaten in this quarter were caught more than 15 km from Sellafield.

Table 1 presents the consumption rates for each of the two methods for the twelve persons who took part in both techniques. The persons represented by observations 1, 2, 3, 5 and 6 thought their consumption rate to be the same as that of the previous year: for them there is good agreement between the results of logging and interview (statistically, by paired t-test, $p = 0.30$). The others stated that their habits had changed. The person represented by observation 4 had been regularly supplied with fish by a local fisherman during the preceding year, but not during the logging year when he had to supplement his supply with fish from beyond the 15 km area. For observations 7, 8 and 9 variations in consumption rate between the quarters were attributable to periods spent away from home. In the case of the people identified as observations 10, 11 and 12, who were members of the previously identified critical group for molluscs, their habits had clearly changed. This was alleged to be due to concern about radioactive contamination, serving as an example of one way in which people's habits may be influenced.

CONCLUSIONS

Both techniques have advantages and disadvantages. These are summarised in Table 2, from which we conclude that the two techniques are complementary.

Table 2 Advantages and disadvantages of interview and logging techniques

Aspect addressed	Interview	Logging
Timescale	Quick guidance on overall picture of individual annual consumption rates for the preceding year	Individual annual consumption rates require four quarters of data before calculation of consumption rate for the current year
Effort	Annual visit Data rapidly analysed	6-10 visits per year Data analysis more time-consuming
Objectiveness	Relies on the skill of the interviewer and judgement of the interviewee	Relies on a person meticulously following the instructions
Cooperation	Given verbal cooperation, all data compiled by the interviewer	Requires person to fill in forms
Accuracy	Only verbal or visual estimate of portion weights often possible No data other than interview record	All portions weighed before cooking Questionnaire gives guidance when converting data to quarterly consumption rates
Comprehensiveness	Indicates consumption of species which may only take place for a short time	Species may not be consumed during logging period

Thus a combination of both methods is recommended, whereby interviews provide the bulk of the data and identify those people who are potential critical group members, and logging is used on those people to help confirm the interview data. The combined information can then be used for the final selection of critical groups for subsequent dose assessments and assist in selection of the appropriate environmental monitoring.

REFERENCES

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