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PILOT STUDY ON THE CHANCE OF ITALIAN SEAFOOD CONSUMERS EXCEEDING THEIR INDIVIDUAL ALLOWABLE DAILY MERCURY INTAKE

by

C.E. Nauen*, G. Tomassi** and G.P. Santaroni**

*Fishery Resources and Environment Division, FAO, Rome, Italy
**Istituto Nazionale della Nutrizione, Rome, Italy

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Introduction

After the casualties in relation to mercury poisoning in the Minamata and Niigata Bay areas in Japan, public concern has increased regarding levels of contaminants, particularly mercury, in seafood. Consequently, numerous worldwide research activities, reflected by a great number of scientific publications, have been directed toward this problem. In the Mediterranean, where about 65% of the world's national mercury resources are located, levels of this metal have been analysed regularly since 1975 in a limited number of species as part of the activities of the FAO/UNEP pilot project on 'Baseline studies and monitoring of metals, particularly mercury and cadmium, in marine organisms (MED POL II)'. With the final scientific evaluation of the pilot project still under way (FAO/UNEP, in prep.), it is nevertheless already evident that mercury levels in some species are higher in the Mediterranean than elsewhere (Cumont et al., 1975; Renzoni et al., 1978).

Since aquatic species can be assumed to be the major source of mercury intake, information on their contamination level is of high interest as to whether human health and, subsequently, the fishery, might be affected. However, intake is also a function of fish consumption, and the same total mercury intake in a given period of time might be the result of high consumption of species with low contaminant levels or the reverse.

Due to high prices and/or insufficient accessibility, consumption of fishery commodities in the Mediterranean tends to be low. In Italy, for instance, the per caput supply is roughly 12.5 kg per year (FAO/OECD, 1979); the consumption pattern, though, may show distinct regional variation, and coastal villagers, particularly in fishing communities, can reasonably be assumed to have an above-average consumption. In case studies, the fishing villages of Carloforte (Cagliari, Sardinia) (Paccagnella et al., 1973) and Seches de Vada (Livorno) (Bacci et al., 1976), were chosen for the investigation of mercury levels in the blood and hair of a number of inhabitants as to evaluate health risks or actual clinical symptoms. Three individuals in the Carloforte population had mercury concentrations in their blood that fell into the range of 20-50 µg/100 ml, associated with the earliest effects in the most sensitive group in the adult population (UNEP/WHO, 1976). The equivalent long-term daily intake would be 3-7 µg/kg body weight as established through epidemiological studies, which had made the Joint FAO/WHO Expert Committee on Food Additives (1972) establish a provisional tolerable weekly intake of 0.3 mg of total mercury per person, of which no more than 0.2 mg should be present as methyl mercury (expressed as mercury); this equals an intake of 5 and 3.3 µg, respectively, per kg of body weight, which up to now serves as reference mark.

Owing to the reluctance of the population to participate in such a study as the above-mentioned, particularly with regard to giving blood samples, and the resulting relatively small sample size, it was difficult to draw conclusions about eventual acute or chronic effects of human health.

A different approach was therefore suggested, the general idea of which was to estimate the chance of seafood consumers exceeding their allowable daily intake of mercury (as taken from the joint FAO/WHO recommendation) by linking together fish contaminant and consumption data. This was to be effected by means of a consumer risk simulation model originally developed in the U.S.A. as a management tool for the Food and Drug Administration in order to evaluate proposed action levels for mercury to ensure consumer safety (Bolton et al., 1980).

The Consumer Risk Simulation Model

It basically interrelates two modules. One, called the species module, calculates mercury levels for every fish species or fish commodity consumed that are found in a contaminant data file. The other one, the consumer module, utilizes consumption data and estimates the respective mercury intake.

The species module is based on mercury data made available through the FAO/UNEP pilot project 'Baseline studies and monitoring of metals, particularly mercury and cadmium, in marine organisms (MED POL II)', a set of market sample analyses accessed through the Italian Ministry of Health, and additional data extracted from the scientific literature (for a summary see Nauen et al., 1980). The model assumes lognormal distributions to fit and plot the contaminant data. It initially asks the user to specify the contaminant data used in respect to species, location of catch, month of the catch and weight of the species. Thus species may be divided geographically, for instance, to 'feed' consumers in the Adriatic fish products from that same area. Similarly, it might be desirable to split tuna, for instance, in two weight groups, since there is reason to believe that smaller tuna remaining in the Mediterranean have higher body burdens of mercury than the big specimens (>200 kg) migrating to the Atlantic (Renzoni et al., 1978). The investigator then has to assign a proportion to the respective factions of the species.

After the identification of each consumed seafood item, the model compares the contaminant level in any one fish with the action level set by the user (i.e. 0.7 ppm for imports to Italy, etc.). Fish with higher contaminant levels will be subject to rejection according to the enforcement level. An enforcement level of 100% will result in their complete rejection. In the case of a lower level, i.e. 50%, the model will randomly reject 50% of the fish exceeding the action level. The remaining 50% are thought to have been accessible to consumers on the market place and are used together with the fish matching action level standards to calculate mean and standard deviation of the species. Finally, the user can substitute species by others in any proportion he wants, an option that allows for data manipulation when new information becomes available.

The second module uses information from the consumption data file pertaining to individual consumers's sex, age, weight, residence, type and quantity of seafood consumed. Since one might not be interested in all consumers, the model has options to define discrete groups according to the individual consumers characteristic, i.e. women in child bearing age (between 16 and 40 years old) who ate fish. Consequently, the actual daily mercury intake of these subjects will be determined and compared with their individual allowable daily intake (ADI).

The model then calculates the percent population at risk for various confidence levels and lists information of consumers that were found to be at risk, particularly estimated daily intake, upper limit of daily intake, types of fish eaten, quantity per meal and servings per month. The general operational steps of the consumer risk simulation model are listed in Figure 1. For more detailed information see Bolton et al. (1980) and the users' guide for the simulation model (Office of Data Processing and Statistics, Charleston Laboratory, 1980).

The Enquiry on Seafood Consumption

Three sites in Italy were selected for a pilot enquiry on seafood consumption. Owing to the limited scope of the pilot study, no attempt was made to launch a representative enquiry for the whole country. Instead, the main interest focussed - as in previous investigations - on coastal populations, particularly fishermen and their families, which are likely to have a seafood consumption markedly superior to that of the normal population. The following criteria were applied to select the sites:

(1) Seafood supply through local fishing activities and/or long distance fleet;

(2) consumption of mostly Mediterranean species, preferably including tuna and swordfish, species with acknowledged elevated mercury levels;

(3) possibility of obtaining the collaboration of the population, eventually by involving local authorities.

The choice finally fell on Marina di Ravenna (Ravenna), Fiumicino (fishing port of Rome) and Bagnara Calabra (Reggio Calabria), where three population groups were considered:

- fishermen on fishing trips,
- fishermen's families
- families resident in the area other than fishermen's families

The consumption was estimated over a period of 20 days by means of introductory interviews and questionnaires (see Annex 1 and 2) left with the fishermen and with the families.

In the initial interview the scope of the investigation was explained and instructions given on how to fill in the questionnaires. Additionally, information on approximate consumption throughout the year was requested since seasonal variation in landings and, subsequently, in consumption pattern would not allow for an extrapolation of consumption beyond the 20 days of the present enquiry.

The first contacts with the families and the fishermen were usually established through local authorities. In Marina di Ravenna and Porto Corsini nearly all of the roughly 200 fishermen are associated in a cooperative. Through this organization a profitable collaboration from the families could be obtained. 184 persons, 92 males and 92 females, in 53 families, 14 of which were fishermen's families, participated in the survey. Except for 5 fishermen, no records on consumption on the fishing vessels during the usual 10-hour trips could be obtained. This was mainly due to a national strike of fishermen, staged during the investigation period (February and March). Owing to adverse meteorological conditions, this time of the year is generally characterized by lower landing, the bulk of which are clupeid fish. The combined effects of the strike and the winter resulted in a greatly reduced availability of locally-caught or even imported fish.

In Fiumicino about 150 fishermen are working on some 40 boats operating along the Tyrrhenian coast, usually for one-day fishing trips. A total of 211 subjects, belonging to 49 families, of which 26 are fishermen's, have been interviewed and reported their fish consumption during 20 days in the period from 8 March to 20 May. 109 panelists were males, 102 females. Due to the same national strike of fishermen and very limited support from the fishermen cooperative and the public health institutions, only 6 fishermen reported on their fish consumption on board the vessel, and generally it was more difficult to persuade people to collaborate than in Marina di Ravenna.

Bagnara Calabra was selected particularly because the area is known in Italy for its high consumption of seafood, particularly swordfish and small tuna. About 10% of the total population are closely related to fisheries. Of the roughly 200 resident fishermen, some practice artisanal fishing whereas the others are involved in industrial fishing operations. The latter stay at sea for periods of time varying between a few days to 2-3 weeks and may land the catch at Capri, Ponza and Ventotene. Eventually, 5 fishermen and 27 families of fishermen and non-fishermen each, totalling 243 panelists, recorded their consumption for 20 days between 10 June and 12 July. 135 were males and 108 females. A list of fishery items consumed in the three study sites in compiled in Table II.

Preliminary Results and Discussion

Since the contaminant data file could so far not be finalized due to new data coming in through the FAO/UNEP pilot project MED POL II, the simulation model was not yet run to estimate the average daily intake of the panelists. Instead the mercury intake of a few fishermen with particularly high consumption was estimated on the basis of mean mercury concentrations in fish as presented in Nauen _et al._ (1980).

These panelists reported to have eaten between 5 and 11 kg of fish in 3 weeks. The frequency sometimes exceeded 20, which means that fish and other seafood were incorporated in the diet more than once a day. Some examples are tabulated (Table III).

Despite the great amounts consumed only one panelist from Bagnara Calabra gets into the critical range of more than 3 µg mercury intake per kg of body weight per day (UNEP/WHO, 1976). More than a third of this can be attributed to the consumption of swordfish. Swordfish and tuna together account for about two thirds of his total intake of mercury. The other species with generally much lower mercury load make up for the rest. In the other example choosen from Bagnare Calabra the share of swordfish and tuna is even more pronounced: 2799 µg out of 3259 µg total mercury intake in 3 weeks are associated with this group of species. This fisherman comes close to the lower level of intake owing to which first symptoms may be expected in the most sensitive group of the population. The other fishermen, though eating more fish, but none or very little of the heavily contaminated species, have average daily intakes of about 1 µg per kg of body weight.

These tentative results, however, should not be considered as representative for the whole year, since consumption is seasonal and as stated above, some constraints in general availability of fish, particularly during the sampling period prevent conclusions for extended periods of time. It should be mentioned also in this context that the quantities of mercury "fed" to the panelists by assuming unweighted average contamination levels (see Nauen et al., 1980 for discussion of mean values) may not realistically reflect the amount ingested and that results generated through the simulation model may differ from the ones shown in Table III. This is due to the fact that the model will use only those fish for the calculation of contaminant levels in any one species that either have mercury levels below the legal action level or that will not be rejected because of an enforcement level lower than 100%.

The model will also allow for more subtle manipulation i. e. through the splitting of species by area and weight or the variation of quality and quantity consumed as to evaluate the impact of any particular species in the diet and possible effects of control measures. The model will, of course, not provide for valuable extrapolation beyond the sampling time owing to the limited nature of the consumer data base. And even though the introductory interviews may serve to get an idea on the composition of the panelists' diet throughout the year, it is not apt to make assumptions on the quantities consumed on the basis of the three week enquiry.

The present pilot enquiry, however, has proven the feasibility of such a study despite some difficulties. It is desirable to extend it to other seasons to enable conclusions with a more general application. This would provide a well founded rationale to tackle the problem of mercury contamination in seafood and allow for an evaluation of any legal or management countermeasures.

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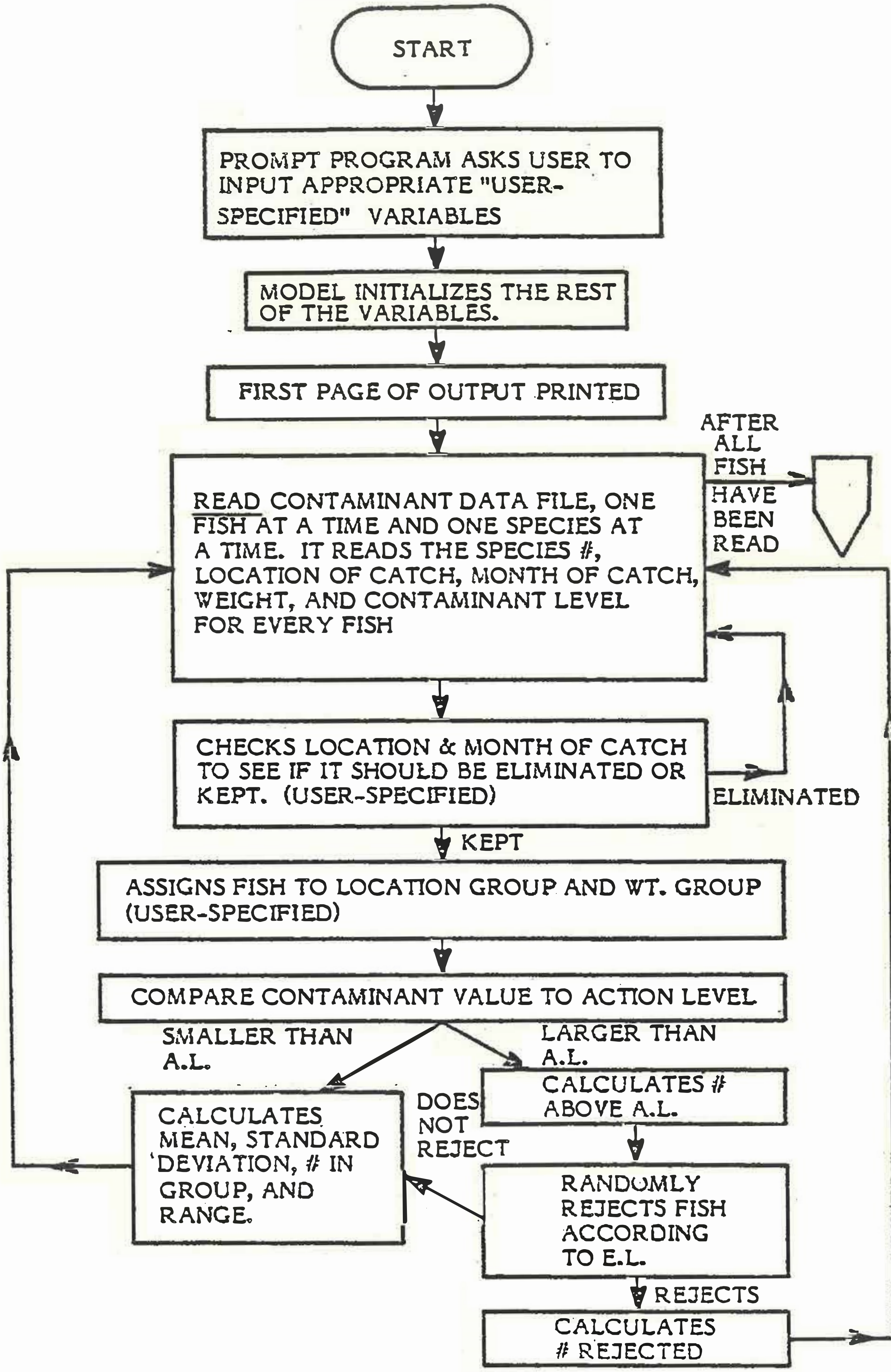

Figure 1. General operations of consumer risk simulation model (source: Bolton *et al.*, in prep.)

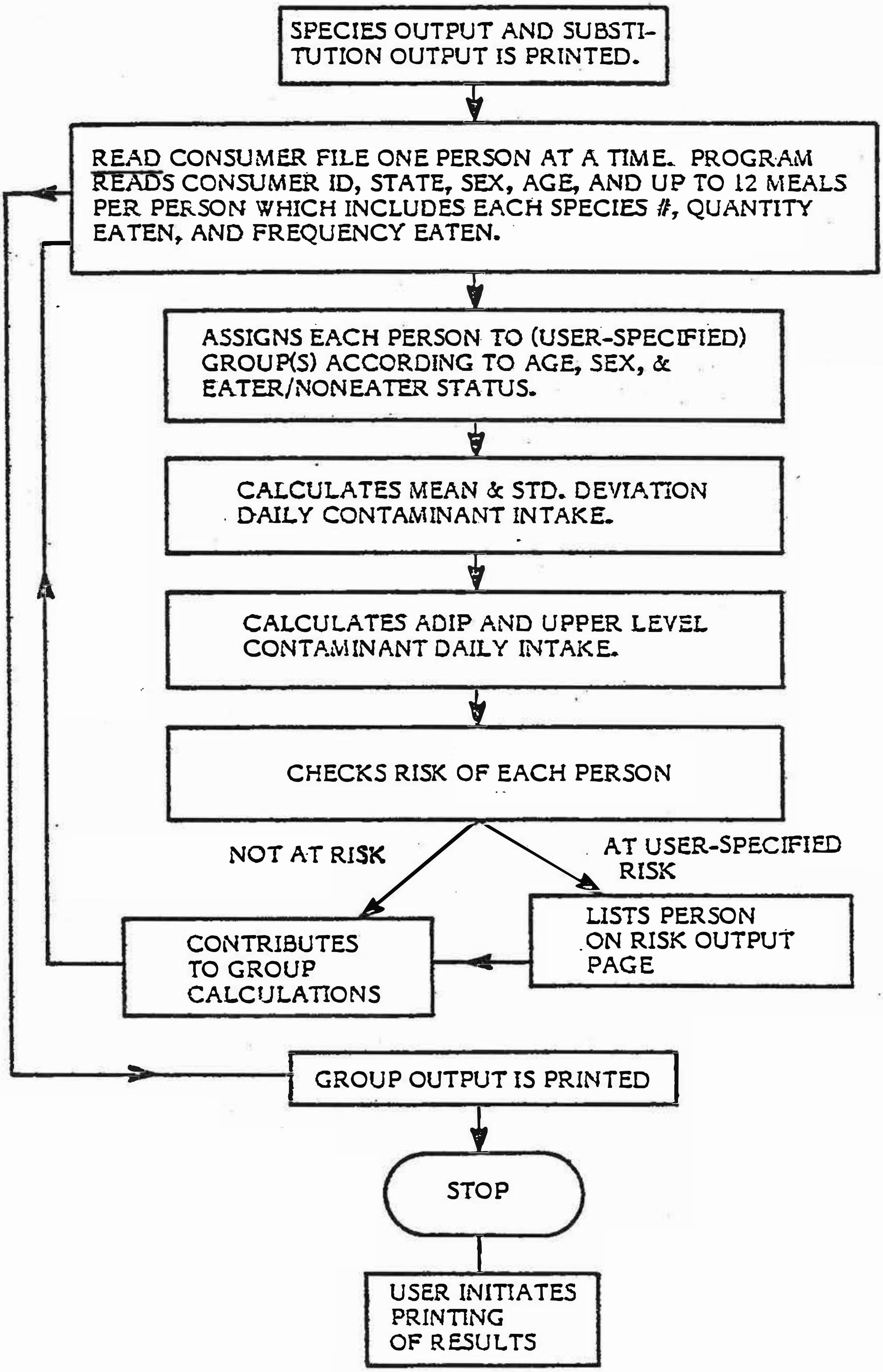
SPECIES OUTPUT AND SUBSTITUTION OUTPUT IS PRINTED.
READ CONSUMER FILE ONE PERSON AT A TIME. PROGRAM READS CONSUMER ID, STATE, SEX, AGE, AND UP TO 12 MEALS PER PERSON WHICH INCLUDES EACH SPECIES #, QUANTITY EATEN, AND FREQUENCY EATEN.
ASSIGNS EACH PERSON TO (USER-SPECIFIED) GROUP(S) ACCORDING TO AGE, SEX, & EATER/NONEATER STATUS.
CALCULATES MEAN & STD. DEVIATION DAILY CONTAMINANT INTAKE.
CALCULATES ADIP AND UPPER LEVEL CONTAMINANT DAILY INTAKE.
CHECKS RISK OF EACH PERSON
NOT AT RISK
AT USER-SPECIFIED RISK
LISTS PERSON ON RISK OUTPUT PAGE
CONTRIBUTES TO GROUP CALCULATIONS
GROUP OUTPUT IS PRINTED
STOP
USER INITIATES PRINTING OF RESULTS

Table I

Age and sex distribution of panelists

Place / Age group	Marina di Ravenna		Fiumicino		Bagnara Calabra	
	Females	Males	Females	Males	Females	Males
0 - 9	5	8	20	14	18	21
10 - 14	9	7	13	14	10	9
15 - 19	10	7	9	13	15	13
20 - 29	13	16	19	24	23	35
30 - 39	16	14	15	9	12	19
40 - 49	9	15	9	16	9	11
50 - 59	16	10	11	11	13	12
60 - 69	8	11	4	7	6	11
≥ 70	6	4	2	1	2	4
Σ	92	92	102	109	108	135

Table II

List of fishery items that have been consumed and/or on which contaminant data are available

Explanation of symbols: F = fish, marine; FF = fish, freshwater; C = crustacea; B = bivalve; S = snail; Ce = cephalopod

Code No.	Contaminant data				Consumed in			Scientific name (family name)	Vernacular name(s)	Abbreviated name	Group
	Ravenna	Fiumicino	Bagnara	Other	Ravenna	Fiumicino	Bagnara				
001					x			*Alburnus alburnus*		Albur	FF
002	x				x	x		*Anguilla anguilla*	Anguilla	Angul	FF
003	x				x		x	*Aporrhais pes pelecani*	Garagolo, Gavagnolo	Aporr	S
004	x				x			*Arnoglossus laterna* (Bothid)	Zanchetto, paratacca	Arnog	F
005		x	x		x			*Argyrosoma regium* (Sciaenid)	Ombrina	Argyr	F
006		x		x		x	x	*Atherina hepsetus*	Cerro, zero, capecciono, latterina	Ather	F
007				x			x	*Auxis thazard* (Scombrid)	Mutolo	Auxis	F
009	x	x	x	x			x	*Boops boops* (Sparid)	Boga	Bboop	F
010				x				*Boops salpa* (Sparid)	Salpa	Bsalp	F
011				x	x	x		*Callinectes sapidus* (Portunid)	Granchio nuotatore	Calli	C
012	x			x				*Carcinus mediterraneus* (Portunid)	Granchio	Carci	C
013							x	*Chlamys varia* (Pectinid)	Pettine	Chlam	B
014				x				*Conger conger*		Congr	F
015		x	x	x		x		*Dentex dentex* (Sparid)	Dentice	Dentd	F
016				x				*Dentex gibbosus* (Sparid)		Dentg	F
017				x			x	*Dicentrarchus labrax* (Serranid)	Branzino	Dlabx	F
018		x	x		x	x		*Dicentrarchus punctatus* (Serranid)	Spigola, spinula	Dpunc	F
129	x	x	x					*Diplodus sargus* (Sparid) (=*D. annularis*, =*D. vulgaris*)	Sparlotto, sarago	Diplo	F
021	x		x			x		*Donax trunculus* (Donacids)	Tellina	Donax	B
022	x							*Eledone moschata*	Polpo muschiato, moscardino	Eledn	F
023	x	x	x		x	x	x	*Engraulis encrasicolus*	Acciuga	Engra	F
024		x	x			x		*Epinephelus guaza* (Serranid)	Cernia	Eguaz	F
025				x				*Epinephelus aeneus* (Serranid)		Eaens	F
026		x	x	x			x	*Euthunnus alletteratus* (Scombrid)	Tonnetto	Euthu	F
028	x	x	x		x		x	*Gobius* sp.	Rosetto, gò, nodino, paganello, ghiozzo	Goblu	F
029							x	*Cymnammodytes* sp.		Gymna	F
030	x	x	x				x	*Hexanchus griseus*	Squalo	Hexan	F
031	x				x	x		*Homarus gammarus*	Astice	Homar	C
031							x	*Lepidopus caudatus* (Trichiurid)	Spatola	Lepid	F
033	x				x			*Lithognathus mormyrus* (Sparid		Lm374	F
034	x	x	x		x	x	x	*Loligo vulgaris*	Calamaro	Lolig	Ce
035				x			x	*Maena* sp. (=*spicara*) (Emmel.)	Minnolo, minulo, zerlo, pescatrice	Maena	F

Table II

Code No.	Contaminant data				Consumed in			Scientific name (family name)	Vernacular name(s)	Abbreviated name	Group
	Ravenna	Fiumicino	Bagnara	Other	Ravenna	Fiumicino	Bagnara				
036				x	x		x	*Merlangius merlangus* (Gadid)	Molo	Merla	F
037	x	x	x	x	x	x	x	*Merluccius merluccius* (Gadid)	Merluzzo, marruzzo, nasello	Merlu	F
038	x	x	x		x	x	x	*Micromesistius poutassou* (Gadid)	Baccalà, melù, moletto, stoccafisso	Micro	F
039							x	*Mola mola*	Pesce luna	Molam	F
040	x	x	x	x	x	x	x	*Mugil cephalus*	Cefalo	Mceph	F
041	x	x	x	x	x	x	x	*Mugil auratus*	Muggine	Maura	F
042	x	x	x	x	x	x	x	*Mullus barbatus* (Mullid)	Triglia di fango	Mulbr	F
043	x	x	x	x	x	x	x	*Mullus surmuletus* (Mullid)	Triglia	Mulsr	F
044	x	x	x					*Mustelus mustelus* (Mullid)	Palombo	Muste	F
045	x							*Myliobatis aquila*	Pesce vescovo	Mylio	F
048	x	x	x	x	x	x	x	*Mytilus galloprovincialis*	Cozza	Mygal	B
049	x	x	x		x	x		*Nephrops norvegicus*	Scampo	Nephr	C
050	x	x	x		x	x	x	*Octopus vulgaris*	Polipo	Octvl	Ce
051				x				*Pagellus acarne* (Sparid)		Pacar	F
052	x			x				*Pagellus erythrinus* (Sparid)	Arbuletto	Peryt	F
053	x							*Pagellus bogaraveo* (Sparid)	Occhialone	Pboga	F
054							x	*Pagrus pagrus* (Sparid)	Pagaro, praia	Pagru	F
055	x							*Palaemon serratus*	Gamberello	Palae	C
056		x	x	x	x	x	x	*Parapenaeus longirostris*	Gambero	Parap	C
057							x	*Patella* sp.	Patella	Patel	B
058	x							*Pecten jacobaeus* (Pectinid)	Pettine, cappasanta	Pecte	B
059	x			x		x		*Penaeus kerathurus*	Mazzancolla	Panae	C
060	x				x			*Platichthys flesus*	Passera	Plati	F
061					x			*Psetta maxima* (=*Scophthalmus maximus*)	Rombo	Psett	F
062	x	x	x					*Raja alba*	Razza marginata, baraccola	Rajal	F
063	x					x		*Raja asterias*	Razza	Rajas	F
064					x	x		*Salmo salar*	Salmone	Salsa	F
065					x			*Salmo trutta*	Trota	Saltr	F
067	x				x	x	x	*Sardina pilchardus* (Clupeid)	Pesce azzurro, acquadella, bianchetto, pesantone, monaceo	Sardi	F
068	x							*Sardinella aurita* (Clupeid)	Alice	Sardn	F
069	x	x	x			x		*Scomber scombrus*	Sgombro	Scomb	F
070							x	*Scomberesox saurus*		Scomx	F

Table II

Code No.	Contaminant data				Consumed in			Scientific name (family name)	Vernacular name(s)	Abbreviated name	Group
	Ravenna	Fiumicino	Bagnara	Other	Ravenna	Fiumicino	Bagnara				
071	x	x			x	x	x	*Scorpaena porcus*	Scorfano nero	Scorp	F
"	x	x			x	x	x	*Scorpaena scrofa*	Scorfano rosso	Scorp	F
072	x	x	x		x		x	*Scyliorhinus canicula*	Gattuccio, canisco	Scyll	F
073				x		x		*Scyllarus arctus*	Cicala di mare	Scyll	F
074	x	x	x		x	x	x	*Sepia officinalis*	Seppia	Sepia	Ce
075	x	x	x		x	x		*Solea vulgaris*	Sogliola	Solea	F
076				x		x		*Sparus auratus*	Orata	Spars	F
077	x				x	x		*Sphaeronassa mutabilis*	Lumaca di mare, lumachina	Sphae	S
078	x	x			x	x		*Sprattus sprattus* (Clupeid)	Papalina, sardone	Sprat	F
130				x				*Squalus acanthias*		Squal	F
079	x				x	x		*Squilla mantis*	Cannocchia, pannocchia	Squil	F
080					x	x		*(Ven)Tapes decussatus*	Arsella	Tapes	B
081			x	x			x	*Thunnus alalunga*	Alalunga	Thala	F
083		x	x		x	x	x	*Thunnus thynnus*	Tonno	Thyfr	F
084		x	x				x	*Tinca tinca* (Cyprinid)	Tinca	Tinca	FF
085	x	x	x				x	*Todarodes sagittatus*	Totano	Todar	Ce
086	x	x	x			x		*Torpedo marmorata*	Pesce tremolo	Tmarm	F
087	x	x	x			x		*Torpedo oculata*	Torpedine ocellata	Tocul	F
088	x					x	x	*Trachinus* sp. (=*draco*, *araneo*, *glaucus*)	Tracina, ciriola	Trach	F
089				x	x	x		*Trachurus mediterraneus*	Sugarello	Tmedi	F
090				x	x	x		*Trachurus trachurus*	Sughero, suro	Ttrac	F
092	x	x			x	x		*Trigla lucerna*	Mazzola, coccio, capone, gallinella	Trigl	F
"								*Trigla* sp.	Angioletto, anzioletto	Trigl	F
093								*Upenaeus moluccensis* (Mullid)	Triglia dorata	Upene	F
094	x			x				*Uranoscopus scaber*	Pesce prete	Urano	F
095	x				x	x		*Venus gallina*	Vongola, poveraccia	Venus	B
096			x	x			x	*Xiphias gladius*	Pesce spada	Xiphs	F
097	x					x		*Zeus faber*	Sanpietro, janitore	Zeusf	F

Table III

Seafood consumption and estimated mercury intake in selected fishermen recorded during a period of 20 days

Place	Marina di Ravenna		Fiumicino	Bagnara Calabra	
Age [years]	52	55	54	36	28
Weight [kg]	65	86	82	68	60
Species	Amount consumed [g]				
Anguilla anguilla			684		
Arnoglossus laterna		300			
Atherina hepsetus				250	
Auris auris 1/				670	1 030
Boops Boops				200	
Callinectes sapidus		500			
Dicentrarchus labrax			167		
Diplodus sargus			684		
Engraulis encrasicolus	500		200	250	120
Euthunnus alletteratus				143	
Gobius sp.		600			
Lepidopus 2/				250	
Loligo vulgaris	400	900		637	330
Maena sp.				567	150
Merlangius merlangus				970	860
Merluccius merluccius			1 673		
Mola				200	370
Mugil cephalus	500	700			
Mytilus gallprovincialis		600		450	400
Octopus vulgaris			1 250		
Parapenaeus longirostris			350	350	270
Penaeus kerathurus			150		
Salmo salar 3/			83		
Sardina pilchardus	4 833	500	100	400	
Scomber sp.			483		
Scorpaena sp.				160	
Scyllarus arctus			350		
Sepia officinalis	500		1 087	200	
Sprattus sprattus		1 700			
Sphaeronassa mutabilis		1 600	583		
Squilla mantis	1 500	1 500			
Tapes decussatus 4/	2 667				
Thunnus alalunga				335	
Thunnus thynnus		110		935	340
Torpedo 5/			100		
Xiphias gladius				1 590	1 390
Total consumption [g]	10 900	9 010	7 944	8 557	5 260
Mercury intake [µg]	1 998	1 668	1 754	4 719	3 259
µg Hg/kg of body weight per day	1.5	1.0	1.1	3.5	2.72

1/ Substituted by *Thunnus thynnus*
2/ Pelagic fish (contamination level assumed here as 100 µg/kg fresh weight)
3/ Substituted by trout from Byrne et al. (1971)
4/ Substituted by *Donax trunculus* (30%) and *Mytilus galloprovincialis* (70%)
5/ Substituted by mixture of rays (160 µg Hg/kg fresh weight)

INCHIESTA SUI CONSUMI ALIMENTARI DI PESCE

della

Divisione delle Risorse di Pesca e dell'Ambiente
Organizzazione delle Nazioni Unite per l'Agricoltura e l'Alimentazione

SCHEDA RILEVAMENTO DEL CONSUMO DI PESCE
(compilata dal pescatore durante le battute di pesca)

AREA DI STUDIO ______________________

COGNOME E NOME DEL PESCATORE ______________________ Nº SCHEDA [ ][ ][ ][ ][ ][0][1]

ETÀ [ ][ ]

Periodo del rilevamento: dal al PESO [ ][ ][ ][ ]

Data	Località di pesca	Longitudine e latitudine (da non riempire)	Qualità e grandezza del pesce consumato	Quantità consumata (in grammi)	Codice qualità (da non riempire)	Note
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				

continua

Nº SCHEDA [ ][ ][ ][ ][ ][0][1]

Data	Località di pesca	Longitudine e latitudine (da non riempire)	Qualità e grandezza del pesce consumato	Quantità consumata (in grammi)	Codice qualità (da non riempire)	Note
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				
		Long. Lat.				
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		Long. Lat.				
		Long. Lat.				
		Long. Lat.				

INCHIESTA SUI CONSUMI ALIMENTARI DI PESCE

della

Divisione delle Risorse di Pesca e dell'Ambiente
Organizzazione delle Nazioni Unite per l'Agricoltura e l'Alimentazione

SCHEDA RILEVAMENTO DEL CONSUMO DI PESCE
(compilata dalla famiglia)

AREA DI STUDIO ____________________

COGNOME DELLA FAMIGLIA ____________________ Nº SCHEDA

Periodo del rilevamento: dal al

Data	Qualità e grandezza del pesce o dei frutti di mare	Descrizione della forma: fresco o conservato	Quantità preparata per il pasto per ciascuna qualità	Quantità non consumata				Membri della famiglia presenti durante il pasto										Codice qualità del pesce (da non riempire)
				3/4	1/2	1/4		01	02	03	04	05	06	07	08	09	10	
							Nome											
							Peso (kg)											
							Età											
							Sesso (f/m)											

continua

Nº SCHEDA

Data	Qualità o grandezza del pesce o dei frutti di mare	Descrizione della forma: fresco o conservato	Quantità preparata per il pasto per ciascuna qualità	Quantità non consumata			Nome	Membri della famiglia presenti durante il pasto										Codice qualità del pesce (da non riempire)
				3/4	1/2	1/4		01	02	03	04	05	06	07	08	09	10	