

Seafood processing in South Africa: a study of working practices, occupational health services and allergic health problems in the industry

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The work practices, occupational health services and allergic health problems among workplaces which process seafood in Western Cape province of South Africa were examined. A cross-sectional study was conducted among 68 workplaces that were sent a self-administered postal survey questionnaire. Workplaces reporting a high prevalence of work-related symptoms associated with seafood exposure were also inspected. Forty-one (60%) workplaces responded to the questionnaire. The workforce consisted mainly of women (62%) and 31% were seasonal workers. Common seafoods processed were bony fish (76%) and rock lobster (34%). Major work processes involved freezing (71%), cutting (63%) and degutting (58%). Only 45% of workplaces provided an on-site occupational health service and 58% of workplaces conducted medical surveillance. Positive trends were observed between workplace size and activities such as occupational health service provision ($P = 0.002$), medical surveillance programmes ($P = 0.055$) and reporting work-related symptoms ($P = 0.016$). None of the workplaces had industrial hygiene surveillance programmes to evaluate the effects of exposure to seafood. Common work-related symptoms included skin rashes (78%), asthma (7%) and other non-specific allergies (15%). The annual prevalence of work-related skin symptoms reported per workplace was substantially higher for skin (0–100%) than for asthmatic (0–5%) symptoms. The relatively low prevalence of employer-reported asthmatic symptoms, when compared to epidemiological studies using direct investigator assessment of individual health status, suggests likely under-detection. This can be attributed to under-provision and under-development of occupational health surveillance programmes in workplaces with less than 200 workers. This is compounded further by the lack of specific statutory guidelines for the evaluation and control of bio-aerosols in South African workplaces.

Key words: Medical surveillance; occupational allergy; occupational health; occupational health services; occupational hygiene; seafood allergy; seafood processing; South Africa; work processes; work-related symptoms.

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INTRODUCTION

Recent years have seen a growing demand for seafood, which has led to increased production.¹ From 1985 to

1989, world harvests of all species increased by 15%, shellfish increased at a rate of 22% and finfish at a rate of 14%.² Approximately 72% of fish and shellfish harvested worldwide are utilized for human food. Increased levels of production and processing of seafood have led, and continue to lead, to more frequent reporting of occupational health problems among workers in this industry. These health problems have been attributed mainly to exposure to excessive noise, low temperatures and poor

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ergonomic practices.³ Recently, occupational seafood allergies have emerged as another important entity that deserves more detailed investigation.

Allergy to fish is common among fish-eating populations and in fish processing communities. The prevalence of fish allergy appears higher when the intake of fish plays a greater part in the diet of the community. Among the few studies providing accurate population based estimates, such as in Norway, the prevalence of fish allergy approaches 1/1000 in the general population.⁴ Workers in the fishing and seafood processing industries are commonly exposed to seafood, especially those involved in either manual or automated processing of crabs, prawns, mussels, fish and fishmeal.⁵ Other occupations associated with potential high-risk exposure to seafood include oyster shuckers, laboratory technicians and researchers, jewellery polishers, restaurant chefs and waiters, fishmongers and fishermen.⁵⁻⁷

The respiratory tract is often the primary route of occupational exposure as a result of inhalation of aerosols generated during seafood processing.⁵ However, reactions can also occur via the dermal route as a result of direct handling of the seafood itself.⁸ These reactions are due to contact with high molecular weight proteins present in the seafood.⁹ Occupational allergic reactions due to seafood manifest themselves as rhinitis, conjunctivitis, asthma, dermatitis and urticaria.¹⁰ Rhino-conjunctivitis and skin symptoms typically precede asthmatic symptoms.¹¹ Another condition that has been associated with occupational exposure to seafood is extrinsic allergic alveolitis.¹² The prevalence of occupational asthma, reported in studies outside Africa using direct investigator assessment of disease status, varies from 7% to 36% and for occupational protein contact dermatitis (commonly referred to as urticaria) from 3% to 11%.^{9,13-16} Both occupational asthma and protein contact dermatitis (PCD) have been associated with occupational exposure to all major seafood groupings including crustaceans, molluscs and bony fish. A higher prevalence of asthma has been found among crustacean (e.g. crab, prawn) handlers whereas a higher prevalence of PCD has been found among bony-fish (e.g. cod, herring) handlers.^{5,17} However, cross-reactivity between various species within and between major seafood groupings has also been demonstrated.^{18,19} The plateau for improvement of occupational asthma symptoms after removal from exposure is, on average, 2 years, with the majority of affected individuals continuing to have signs and symptoms of asthma.^{20,21} Similarly, despite cessation of continued shellfish exposure, some individuals with PCD experience persistent skin symptoms.¹⁷

The seafood industry is an important contributor to the regional economy of the West Coast in Western Cape province of South Africa. The fishing and seafood processing industry in South Africa employs approximately 28,000 workers in more than a 100 workplaces.²² These workers are directly dependent on the industry, supplying food for the whole of the southern African sub-region.²³ Labour in the industry tends to be divided along gender lines with men almost exclusively going out to sea to catch the fish and women doing the majority of

on-land seafood processing. A considerable proportion of the workforce is seasonal. The degree of exposure to seafood is likely to be highest during the harvest season, which varies according to the seafood type, when most of the processing occurs.

The population-based disease burden attributable to seafood allergy among seafood eating communities such as those of Western Cape province, or among workers in the South African seafood industry has not been previously documented. The only published study investigated the range of allergy due to seafood ingestion among a group of 105 volunteers from the general public in Western Cape.²⁴ The most common seafood species reported by subjects to cause allergic reactions were prawn (47%), rock lobster (44%), abalone (35%), black mussel (33%), and oyster (24%). The bony fish species implicated were hake (25%), yellowtail (22%), salmon and mackerel (15%), kingklip (13%) and snoek (11%). Among the subjects, about 30% reported respiratory and/or cutaneous symptoms after handling seafood or inhaling aerosols from the cooking process. The high prevalence of symptoms with these exposures, which were usually domestic rather than occupational, along with the likelihood that similar workplace exposures would be more intense and prolonged, confirmed the importance of investigating the health effects of these occupational exposures among workers in this province of South Africa.

Comprehensive data on occupational disease burden in general and specific health outcomes associated with occupational allergy in the seafood processing industry is lacking. For the year 1998, a total of 5679 cases of occupational diseases were reported under the workers compensation law, Compensation for Occupational Injuries and Diseases Act (COIDA) (H. Flint, Office of the Compensation Commissioner, Department of Labour, Pretoria; personal communication).²⁵ Among these, 180 cases of occupational asthma (3%) and 678 cases of dermatitis of an allergic or irritant nature (12%) were reported. The current reporting format of these figures does not allow the proportion of diseases due to seafood processing to be ascertained. A separate surveillance system, the Surveillance for Occupational Respiratory Diseases in South Africa (SORDSA), which has been operating for the past 3 years, has not received from participating physicians any reports of asthma cases due to seafood allergy (T. Esterhuizen, National Centre for Occupational Health, Johannesburg; personal communication). These data suggest that reporting bias may be present, which is most likely due to the under-provision of occupational health services and the lack of awareness and experience among occupational health practitioners in identifying such cases.

The main objectives of the study were to characterize the demographic profile of seafood processing workplaces in Western Cape province of South Africa; to determine the various occupational settings in which exposure to seafood occurs, and to identify specific workprocesses associated with high risk exposure; to determine the level of occupational health service provision with specific reference to the medical surveil-

lance of workers in these various workplaces; and to determine the employer-reported prevalence of common work-related symptoms (dermatitis and asthma) associated with seafood exposure in these various workplaces.

PARTICIPANTS AND METHODS

A cross-sectional employer-based survey design was used to conduct the study in 1997. The target study population included all workplaces in Western Cape province which were listed in the most recently available edition of the *Fishing Industry Handbook of South Africa and Namibia* (1994), produced by the seafood industry.²⁶ The handbook contained contact details and types of seafood handled by producers of seafood products. A total of 221 workplaces were listed for South Africa and Namibia. Among the 156 workplaces in South Africa, 115 (74%) were located in Western Cape (having a postal code 6500-8300). Each workplace was contacted by telephone to confirm that they were still in operation; that they had five or more workers in their employ; and to ascertain the name of the contact person to whom the questionnaire should be sent. After applying these criteria a total of 68 workplaces were targeted for inclusion in the study. The remaining workplaces were either too small or no longer operating and were therefore excluded from the study.

The measurement tool was a pre-piloted, structured postal questionnaire. Both English and Afrikaans versions of the questionnaire were used. The contact person at each facility, usually a senior management person or occupational health nurse practitioner, was contacted by telephone prior to sending the questionnaire. An explanation of the study was given and the person was requested to respond to the questionnaire either by fax or by post using a stamped, pre-addressed envelope. Various incentives to participate in the study were outlined by the researchers in the covering letter to the respondents. This included sending the respondents an educational poster on health and safety; preferential access to a specialized clinical diagnostic service for workers suspected of having occupational seafood allergy; and promising them feedback on the overall results of the study. The respondents were also assured that all results for individual workplaces would be treated confidentially. In an attempt to improve the response rate the person was again contacted by telephone after 1 month if no response was received.

The survey instrument (see Appendix 1) included questions on: (1) details of the company and the contact person; (2) types of seafood processed and the production processes involved; (3) demographic details of the workforce; (4) presence and nature of occupational health activities provided; and (5) number of workers with common work-related symptoms associated with seafood processing.

The researchers also conducted targeted inspections of five workplaces (two in Cape Town and three in Saldanha Bay) that reported in the questionnaire a high

prevalence of work-related symptoms. This was to ascertain more information on the specific work processes involved and to identify high-risk exposures associated with these work processes.

Data entry and analysis was conducted using Epi Info statistical package (Version 6).²⁷ Univariate analyses summarized the distribution of each measured variable. The Mantel-Haenszel chi-square test for linear trend was used to explore the relationship between workforce size and the provision of various occupational health activities. The Mantel-Haenszel chi-square test was used to identify significant differences among workplaces conducting various occupational health activities.

RESULTS

Postal survey

The study obtained a 60% ($n = 41$) response rate. Three workplaces were subsequently removed from the final analysis ($n = 38$) because they were involved primarily with exporting rather than processing seafood. The majority of respondents to the questionnaire were factory managers (60%), followed by occupational health nurse practitioners (20%), and risk/loss control officers (3%). Most of the workplaces were located along the west coast of the province (84%) with a high concentration (45%) of workplaces located between Saldanha Bay and St Helena Bay. The workforce size among the individual workplaces ranged from 6 to 2400. A large proportion (48%) of workplaces were small (employing 5-49 workers) and (24%) medium-sized (employing 50-199 workers) enterprises, while only 29% of workplaces employed more than 200 workers. Among the total of 8532 workers employed by all these workplaces, the majority (62%) were women and 31% were seasonal workers.

The most common seafoods processed (Fig. 1) by these workplaces were bony fish (76%) and rock lobster (34%). Among the bony fish, hake (47%) and pilchard (26%) were by far the most commonly processed. The former was primarily used for filleting purposes and the latter for canning. More than half the workplaces used freezing (71%), cutting (63%) and degutting (58%) procedures (Fig. 2). Other associated seafood processing activities not commonly used but reported were farming, drying, smoking, mincing, frying, filleting and fishmeal production.

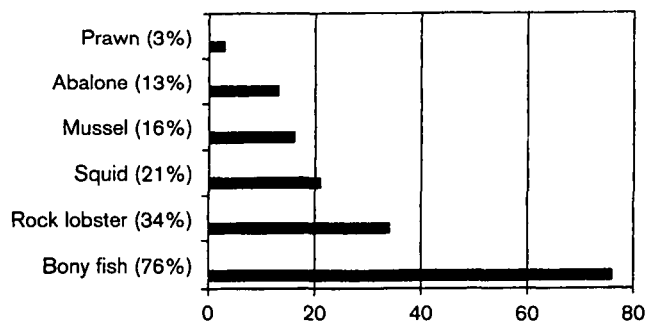
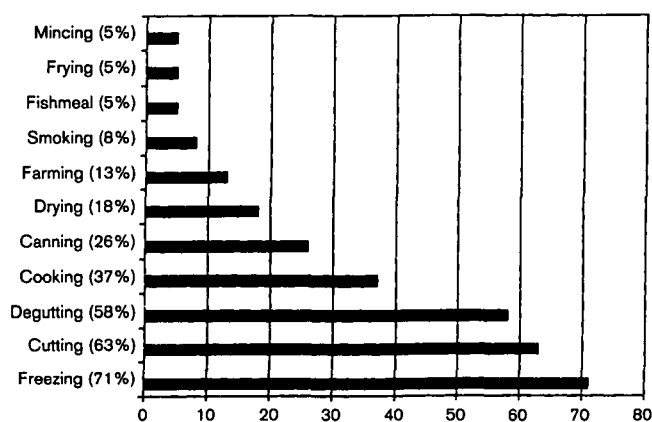
Less than half (45%) of workplaces provided an occupational health service on-site and only 58% of workplaces conducted some form of medical surveillance of their workers (Table 1). None of the workplaces had industrial hygiene surveillance programmes designed to evaluate the aerosols generated during the production process. Positive trends were observed between the size of the workforce and the provision of an occupational health service ($P = 0.002$), existence of medical surveillance programmes ($P = 0.055$) and identification of at least one worker per workplace with work-related symptoms ($P = 0.016$). Workplaces employing more than 200 workers were more likely to provide an

Table 1. Percentage of seafood processing workplaces in Western Cape province of South Africa which conduct occupational health activities, according to size of workforce

Occupational health activity	Total no. of workplaces (n = 38)	Number of workplaces by workforce size (%)			*P value
		Small (%) (n = 18)	Medium (%) (n = 9)	Large (%) (n = 11)	
Occupational health service on-site	17 (45%)	4 (22%)	4 (44%)	9 (82%)	0.002
Medical surveillance programme	22 (58%)	8 (44%)	5 (56%)	9 (82%)	0.055
Industrial hygiene programme	0	—	—	—	—
Work-related symptoms/ailments reported in the past year	19 (50%)	5 (28%)	5 (56%)	9 (82%)	0.016

Note: small = 5–49 workers; medium = 50–199 workers; large = 200 or more workers.

*Mantel–Haenszel chi-square test for trend.

Figure 1. Common seafood processed in workplaces in Western Cape province of South Africa. Results are given as percentage of responding workplaces (n = 38).**Figure 2.** Common work processes used in seafood processing workplaces in Western Cape province of South Africa. Results are given as percentage of responding workplaces (n = 38).

occupational health service, conduct medical surveillance programmes, and identify at least one worker per workplace with work-related symptoms associated with seafood processing.

There was a significant association between workplaces with an on-site occupational health service and the existence of a medical surveillance programme ($P < 0.005$) (Table 2). However, no statistically significant association was found between workplaces with medical surveillance programmes and those that had

Table 2. On-site occupational health service provision and reporting of work-related symptoms by presence/absence of medical surveillance programme among seafood processing workplaces in Western Cape province of South Africa

Occupational health activity	Medical surveillance programme (n = 38 workplaces)			*P-value
	Present	Absent	Total (%)	
Occupational health service present	15 (88%)	2 (12%)	17 (100%)	<0.005
Work-related symptoms/ailments reported in the past year	13 (68%)	6 (32%)	19 (100%)	0.189

*Mantel Haenszel chi-square test.

Table 3. Distribution of annual prevalence figures of common work-related symptoms/ailments reported by seafood processing workplaces in Western Cape province of South Africa

Prevalence (%)	Skin rash	Asthma symptoms	Other allergic symptoms (e.g. rhinitis, conjunctivitis)
0	22 (58%)	31 (81%)	32 (84%)
1–5	11 (29%)	7 (19%)	3 (8%)
6–10	1 (3%)	0	0
≥11	4 (10%)	0	3 (8%)
Total	38 (100%)	38 (100%)	38 (100%)

reported work-related symptoms in the past year ($P = 0.189$).

The work-related symptoms as reported by workplace managers and/or occupational health practitioners are summarized in Table 3. Skin rash accounted for 78% of all reported health problems, asthmatic symptoms for 7%, and other non-specific allergic symptoms (e.g. rhinitis, conjunctivitis, angioedema) a further 15%. Most workplaces reported the annual prevalence of work-related symptoms to be less than 5%. However, the annual prevalence of work-related skin symptoms reported per workplace was substantially higher for skin (0–100%) than for asthmatic (0–5%) symptoms. Skin symptoms of more than 5% were reported by 13% of workplaces. In one of the workplaces all six workers (100%) were reported to have skin symptoms. This

workplace processed rock lobster and abalone. Other workplaces with high prevalence (15–73%) of skin symptoms commonly processed rock lobster, abalone, squid and bony fish (hake, kingklip and salmon). These same workplaces also reported a higher prevalence (4–5%) of workers with asthmatic symptoms when compared to the majority of workplaces (58%) that reported near zero prevalence figures for skin symptoms. All these workplaces used cutting, degutting and freezing techniques to process and store the seafood. In general, it was not possible to unequivocally attribute symptoms reported by workplaces to specific seafood types because most workplaces processed more than one type.

Workplace inspections

There was substantial variation in processing methods of the various seafood types in these workplaces. Representative descriptions of commonly observed work processes and sources of potential high-risk exposure to seafood products are outlined in Table 4. Aerosolization of the seafood during processing was identified as a potential high-risk activity for sensitization through the respiratory route. Identified processes with high potential for aerosol exposure included scrubbing and tailing of

rock lobster; degutting, heading and cooking/boiling of fish; and bagging of fishmeal. Workers employed in highly automated facilities were also at high risk due to inadequate and poorly designed local exhaust ventilation systems in these plants. High-risk dermal exposure occurred as a result of unprotected handling of rock lobster or various fish types, the latter generally occurring under wet and low temperature conditions.

DISCUSSION

This is the first African study, to the authors’ knowledge, to document employer-acknowledged, work-related symptoms and allergic health problems among workers in the seafood processing industry. Walk-through inspections of a number of facilities suggest that inadequate control of inhalational and skin exposure, which was especially common in small and medium-sized workplaces, may be contributing to the burden of disease. Major activities that provide a potential source for sensitization through inhalation of aerosols are cutting or degutting, scrubbing or cleaning, cooking or boiling, and drying activities. Unprotected skin exposure, due to the lack of personal protective equipment such as gloves, provides an alternative source of sensitization. Employers

Table 4. Commonly observed work-processes used in the seafood processing industry of Western Cape province of South Africa and sources of potential high-risk exposure to seafood products

Activity	Description of processing steps	Sources of potential high-risk exposure to seafood products
Rock lobster preparation	Lobsters kept alive in saltwater tanks before being placed in freshwater baths to 'drown'. Manually removed from baths, washed and cleaned of extraneous debris and extruded lobster gut contents. Large lobsters undergo 'tailing' (tail manually removed prior to steaming). Packed manually in trays and cooked in steaming oven. Manually removed from ovens and immersed in ice-cold water baths. Washed and scrubbed manually using water-jet sprays and brushes. Graded and packed into trays before refrigeration storage.	Inhalation of wet aerosols during tailing, steaming and scrubbing. Dermal contact from unprotected handling of lobster; immersion of hands in water storage baths containing extruded lobster gut material.
Fish canning (e.g. pilchard, mackerel, anchovy)	Chilled fish pumped via chutes from capture boats. Fish hooked manually on conveyor belt. Transported to automatic degutting machine for decapitation and evisceration. Fish inserted into water-containing cans and boiled as cans pass through oven on conveyor belt. Tomato-based sauce and spices added to cans. Prior to autoclaving, cans sealed. Cans labelled and packed in large storehouses.	Inhalation of wet aerosols during degutting and cooking/boiling. Dermal contact from unprotected handling of various fish types.
Fish filleting (e.g. kingklip, hake, snoek)	Small plants: mainly manual cutting and degutting. Large plants: fully automated machines performing degutting, heading, skinning, filleting, grading and trimming fish to specific portion sizes. Cryogenic technology used to freeze fish fillet. Phosphates added during freezing and storage.	Inhalation of wet aerosols during degutting and heading. Dermal contact from unprotected handling of various fish types.
Fishmeal production (e.g. anchovy, red eye, lantern fish and pilchard offal)	Fish transferred via conveyor belt from capture boats. Oil removed from fish via fully enclosed process. Subjected to high temperatures to produce dry product. Fishmeal milled into finer solid particles. Pumped through chutes to bagging section where fishmeal poured into hessian bags (semi-automated), sealed and stored. Spilled fishmeal manually swept, shovelled and tipped into bags.	Inhalation of dry dust aerosols during fishmeal bagging.

identified work-related skin symptoms to be the most commonly reported health problem (78%). These skin symptoms may be due to working under wet conditions without wearing gloves or exposure to various agents known to be associated with dermatological problems in the seafood processing industry. These include primary irritants (e.g. vinegar); biochemical sensitizers (e.g. garlic, onion and, spices); and the proteins originating from shellfish.^{8,10,28} The high prevalence of skin symptoms in workers at some of these workplaces is of substantial concern since it has been estimated that up to one-third of food handlers and caterers with occupational skin disease may need to find alternative employment because of debilitating symptoms.¹⁷ Moreover, despite cessation of continued shellfish exposure, some individuals may have persistent symptoms.

Skin diseases associated with seafood exposure appear to be the most easily recognizable occupational disease burden in the industry. In contrast, there appears to be considerable under-detection and/or under-reporting of respiratory health problems. The annual prevalence of work-related asthmatic symptoms, based on employer reports, among employees at these workplaces was between 0% and 5%. This figure contrasts with much higher prevalences rates of 7–36% for occupational asthma reported in the literature, based largely on direct investigator assessments of individual workers.^{9,13} It is believed that this apparent under-reporting and/or under-recognition can be attributed, in large part, to the lack of well-developed occupational health surveillance programmes, especially in workplaces with less than 200 workers. Under-reporting for this reason may be compounded by a general lack of awareness and experience among doctors and nurses in appropriate diagnostic techniques, particularly immunological tests, which until recently have not been available in this country.²⁹ This may explain in part the lack of an association between the presence of a medical surveillance programme in the workplace and the positive reporting of work-related seafood associated symptoms. There may also be some contribution from a general bias toward under-reporting in employer-provided data in the current sociopolitical setting. If such a bias is present, the comparison of our data to that reported in the literature suggests that it operates much more for respiratory than for dermatological occupational disease.

It is also possible that the differences in the reported prevalences between respiratory symptoms and skin symptoms are explained in part by the respiratory symptoms being more disabling, leading to a proportionately greater 'healthy worker' effect. Susceptible workers either avoid 'high-risk' jobs or quit after a short time ('healthy hire' effect). Alternatively, at the time of the study the most affected workers may have already left the workplace or moved to low exposure jobs and therefore did not appear on current company records as ill ('survivor' effect). In a cross-sectional study such as this, both factors tend to underestimate the true prevalence of disease occurrence among workers in high-risk jobs.³⁰

None of the workplaces undertook industrial hygiene surveillance programmes designed to evaluate the aerosols generated during the production process. This is probably due to a lack of awareness among workers and employers of the risks associated with these work processes, poor statutory enforcement, and an under-developed industrial hygiene capability for evaluating bio-aerosols in the country. The various legislative requirements that address the health and safety of food workers in South Africa are sometimes mutually inconsistent, have a narrow focus, and are enforced unevenly by a multitude of different government departments.³¹ The two laws that are most relevant to the health and safety of workers exposed to seafood are the Occupational Health and Safety Act (OHSA) and the Merchant Shipping Act.^{32,33} The former covers health and safety of workers on land and the latter covers fishermen. While no specific statutory guidelines historically existed for the evaluation and control of bio-aerosols in the workplace (although regulations for hazardous biological agents are currently being drafted), there are some laws that pertain to medical surveillance of food workers. The Foodstuffs, Cosmetics and Disinfectants Act and the Health Act deal with food hygiene and safety in general, while the Standards Act (through the South African Bureau of Standards (SABS)) has specific relevance to seafood processing.^{34–36} All three laws are geared primarily towards fulfilling consumer needs. In addition, given the more widely appreciated association of allergic reactions among consumers, seafood allergy, when it does arise as a consequence of occupational exposure, is more likely to be incorrectly attributed to non-occupational exposures. It is likely that all the above factors contribute to some extent to the lack of appropriate engineering controls to reduce exposure to those workers involved in seafood processing activities and to the limited monitoring of their health.

Among the 60% of facilities that responded to the questionnaire, the study findings provide some insight into the level of occupational health service provision; occupational health practices; and the allergic health problems associated with seafood processing among workplaces in Western Cape province of South Africa. The extent to which these findings can be used to generalize about the seafood processing industry of the southern African sub-region and beyond is uncertain, since detailed information was not easily obtainable from non-responders to the study.

It is recommended that further epidemiological studies focus on quantifying the disease burden attributed to seafood exposure, particularly in Africa, and identify specific risk factors for allergic sensitization to occupational seafood allergens. This would necessitate the development of appropriate industrial hygiene monitoring techniques for exposure characterization of those workers at risk and medical surveillance protocols that utilize more sensitive immunological markers for early diagnosis. In this manner the pattern of occupational seafood allergy in seafood processing factories in Africa and its southern African sub-region can be better characterized. This will also result in more reliable

information being available to guide the timely implementation of appropriate interventions to minimize inhalational and dermal exposure to seafood products. The determination of appropriate quantitative exposure limits may require more detailed epidemiological studies. However, it appears that appropriate control strategies based on current knowledge can be designed in the interim. Specifically designed programmes may be needed to assist small and medium-sized workplaces that generally do not have the capacity to manage the health risks associated with these processes.

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Appendix 1. Questionnaire for the study of seafood processing workplaces in Western Cape province of South Africa, 1997

Study No.

Name of Company: _____

Contact Person: _____

Position: Occupational health sister ☐

(indicate with an "x") Health and safety/risk/loss control officer ☐

Human Resources Department ☐

Manager ☐

Other (specify _____) ☐

Physical/Postal Address: _____

Telephone: (_____) _____ Fax: (_____) _____

1. Please indicate (with an "x") type of seafood/s processed:

Mussels	☐	Rock lobster	☐
Abalone	☐	Fish (indicate type)	☐ _____
Squid	☐	Other (specify)	☐ _____

2. Please indicate (with an "x") the type of production process/es involved:

Cooking/boiling	☐	Cutting	☐	Canning	☐
Degutting	☐	Freezing/Thawing	☐	Drying	☐
Other (specify)	☐	_____			

3. Please indicate number of employees:

	<u>Permanent</u>	<u>Seasonal</u>
Male		
Female		
Total		

4. Do you have an occupational health service at your workplace? Yes ☐

(Please indicate with an "x") No ☐

5. Is there a medical surveillance programme in place to monitor the health of Yes ☐

your employees? (Please indicate with an "x") No ☐

6. Have you ever had an employee/s complaining of work-related symptoms? Yes ☐

e.g. asthma/skin rash/other allergy (Please indicate with an "x") No ☐

7. If yes, please indicate in the box the number of workers per year (only for the past year)

Asthma Skin Other allergy

8. Is there an industrial hygiene surveillance programme to evaluate exposure Yes ☐

to seafood aerosols? (Please indicate with an "x") No ☐

THANK YOU! (Please note all individual information will be treated as confidential)