



Fish consumption behavior and rates in native and non-native people in Saudi Arabia



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ARTICLE INFO

Article history:

Received 27 February 2014

Received in revised form

5 May 2014

Accepted 7 May 2014

Available online 11 June 2014

Keywords:

Fishing

Fish consumption

Saudi Arabia

Meal/week

Meal size

ABSTRACT

Fish are a healthy source of protein and nutrients, but contaminants in fish may provide health risks. Determining the risk from contaminants in fish requires site-specific information on consumption patterns. We examine consumption rates for resident and expatriates in the Jeddah region of Saudi Arabia, by species of fish and fishing location. For Saudis, 3.7% of males and 4.3% of females do not eat fish; for expatriates, the percent not eating fish is 6.6% and 6.1% respectively. Most people eat fish at home (over 90%), and many eat fish at restaurants (65% and 48%, respectively for Saudis and expatriates). Fish eaten at home comes from local fish markets, followed by supermarkets. Saudis included fish in their diets at an average of 1.4 ± 1.2 meals/week at home and 0.8 ± 0.7 meals/week at restaurants, while expats ate 2.0 ± 1.7 meals/week at home and 1.1 ± 1.1 meals/week in restaurants. Overall, Saudis ate 2.2 fish meals/week, while expats ate 3.1 meals/week. Grouper (*Epinephelus* and *Cephalopholis*) were eaten by 72% and 60% respectively. *Plectropomus pessuliferus* was the second favorite for both groups and *Hipposcarus harid* and *Lethrinus lentjan* were in 3rd and 4th place in terms of consumption. Average meal size was 68 g for Saudis and 128 g for expatriates. These data can be used by health professionals, risk assessors, and environmental regulators to examine potential risk from contaminants in fish, and to compare consumption rates with other sites.

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1. Introduction

Fishing and fish/shellfish consumption are important aspects of culture in many places in the world, particularly for coastal communities, as well as being a method of obtaining protein (Toth and Brown, 1997; Institute of Medicine (IOM), 2006; Burger and Gochfeld, 2001). High fishing rates occur in many different cultures, including both rural and urban areas (Burger et al., 2001a, 2001b; Bienenfeld et al., 2003), and in other regions of the world, particularly in Asia (Burger et al., 2003; Lu et al., 2008; Hsiao et al., 2011). Well over half of the world's population resides within 100 km of oceans, making it important to understand the factors that affect the health and safety of marine fish as a food source. Seafood consumption is generally increasing in many parts of the

World, particularly for coastal communities (NOAA, 2004). In many places, fish and shellfish are the only readily available sources of protein that people can self-harvest, often throughout the year.

Fish provide high-quality protein, vitamins, and other nutrients that are essential to human health; regular fish consumption is widely promoted as part of a healthy diet (Sidhu, 2003; Verbeke and Vackier, 2005; Sioen et al., 2008, Sun, 2008). There is growing evidence that fish consumption reduces the risk of cardiovascular disease and has beneficial effects on fetal development during pregnancy (Olsen and Secher, 2002; Patterson, 2002; Olsen et al., 2006). Fish consumption is associated with low blood cholesterol (Anderson and Wiener, 1995), positive pregnancy outcomes, and better child cognitive test performances (Oken et al., 2008). Fish (and fish oil) contain omega-3 (n-3) fatty acids that reduce cholesterol levels and the incidence of heart disease, blood pressure, stroke, and pre-term delivery (Kris-Etherton et al., 2002; Daviglus et al., 2002; Patterson, 2002; Mozaffarian and Rimm, 2006; Virtanen et al., 2008; Mozaffarian, 2009; Ramel et al., 2010).

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Yet people are faced with deciding whether the benefits of eating fish outweigh the risks from contaminants. Consumption of fish, shellfish and other seafood is the primary source of exposure to contaminants (Institute of Medicine (IOM), 2006), especially

methylmercury and PCBs (NRC, 2000; Rice et al., 2000; Stern et al., 2004). Determining the effect of contaminants on humans and eco-receptors requires site-specific information on contaminant levels and consumption patterns (Burger et al., 1992, 1999, 2001a,

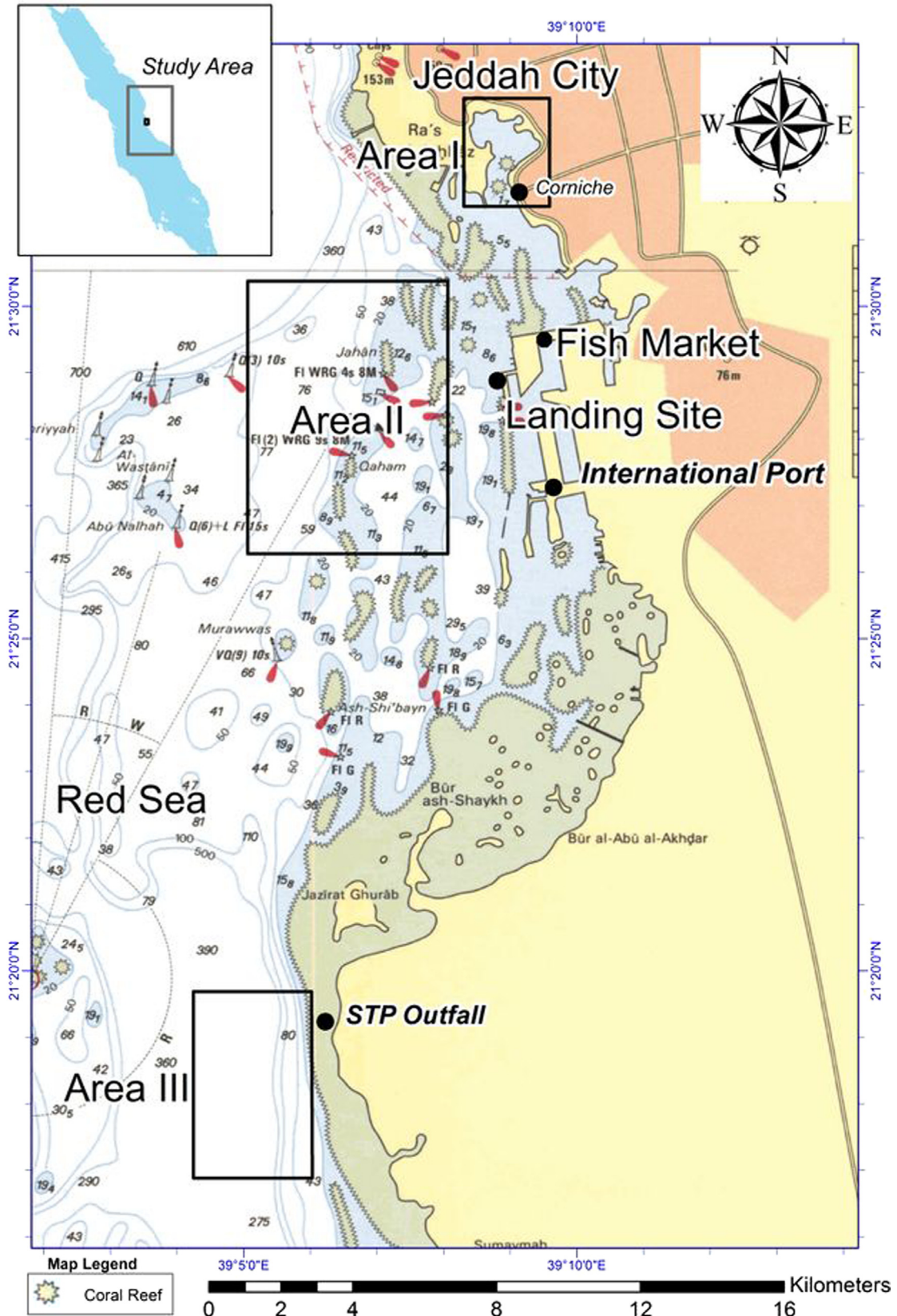


Fig. 1. Map of the Jeddah region where fish consumption was examined.

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