

A Study on the Household Use of Iodised Salt in Sindh and Punjab Provinces, Pakistan: Implications for Policy Makers

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Abstract: *Purpose:* To assess knowledge, attitude and practices with respect to use of iodised salt, and to estimate its uptake at household level in Sindh and Punjab, Pakistan.

Methods: A cross sectional survey was conducted between January and March 2007. A structured questionnaire was administered and household salt tested for iodine content across 9,701 households to identify current knowledge and practices towards use of iodised salt.

Results: Nearly 85% of the salt tested had no iodine, 8% had iodine levels of at least 75 ppm, whereas 7% of the salt contained between 15 and 50 ppm of iodine. The results of multivariate logistic regression analysis revealed that in comparison to urban areas, rural households were more likely not to use of iodised salt (adjusted odds ratio (AOR) =1.38, 95% CI 1.16-1.62), and Province Sindh was less likely not to use of iodised salt as compare to Punjab (AOR =0.81, 95% CI 0.69-0.96). In addition, results also revealed that illiteracy (AOR =1.61, 95% CI 1.28-2.04), no knowledge of iodised salt (AOR =2.09, 95% CI 1.44-3.04), unavailability of iodised salt (AOR =2.93, 95% CI 2.10-4.07), and unawareness about the advantages of use of iodised salt (AOR =1.97, 95% CI 1.65-2.36) were the main associated factors with non-use of iodised salt for cooking at household levels in Sindh and Punjab provinces, Pakistan.

Conclusions: Despite awareness of iodised salt, actual use of adequately iodised salt was much lower, hence collaborative efforts between public and private sectors are strongly recommended to increase the availability and salt iodization in Pakistan.

Keywords: Iodine deficiency, salt iodization, salt test kits, Sindh, Punjab.

1. INTRODUCTION

Globally, Iodine deficiency disorders (IDDs) are associated with many thyroid related diseases including hypothyroidism, hyperthyroidism, goiter and cretinism and also inherit real risk of coronary artery diseases, autoimmune disorders, psychiatric disorders, cognitive impairment and cancer [1-3]. Several studies on patients with spontaneously occurring hypothyroidism and hyperthyroidism have proved that thyroid hormones can effects on the heart and cardiovascular system [4, 5]. Hypothyroidism can increase the risk of death from heart disease and stroke [6-8].

Iodine deficiency disorders are a global problem, and it is estimated that IDDs affect 2 billion people worldwide [9-12]. Salt iodization has been truly one of the most successful interventions as it is feasible, economical, safe, most effective and broadly accepted. There is also now considerable experience in many different countries, cultures and their dietary practices [13]. Salt iodization programs have been implemented in many countries of the world, and two-thirds of the global population (71%) is estimated to be covered by iodised salt [14]. About 31% (1900.9 million) of the

world population is estimated to have insufficient iodine intakes, with the most affected WHO regions being South-East Asia and Europe [15]. In developing countries, 69% of households were consuming iodised salt, while in the least developed countries; the rate was only 53%. Worldwide, UNICEF estimates that just over two-thirds (68%) of households are using iodised salt, and percentage of households consuming iodised salt (1998-2004) in Pakistan is 17%, India 50%, Afghanistan 28%, and Bangladesh 70% [16].

In Pakistan IDDs are affecting about 50 million population of whom 6.5 million are seriously affected [17]. IDD is not only confined to the hilly areas of the country [18-22], where its prevalence is reported up to 90%, but is also prevalent in the plain areas like Swabi, Peshawar, Islamabad, Lahore, Karachi and Quetta [23-26]. Estimates of uptake of iodised salt at National levels are scarce and in most of cases not available for different regions of Pakistan. A representative estimate was required that would help the national, local governments and the non-governmental organizations (NGOs) in improving the use of iodised salt at household level, thereby decreasing the iodine deficiency disorders at large.

The aim of the present survey was to assess knowledge, attitude and practices with respect to current use of iodised salt, and to estimate its uptake at

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household level in Sindh and Punjab provinces, Pakistan.

2. METHODS

Following a pilot study including sub-samples of urinary iodine in rural and urban districts of Sindh, a cross-sectional survey was conducted in all districts of Sindh and Punjab provinces from January to March 2007. A structured knowledge, attitudes and practices (KAP) questionnaire was administered and household salt tested across 9,701 households to identify current knowledge and practices towards use of iodised salt at household level.

2.1. Study Design

A multi stage cluster design was selected for the survey in order to obtain a representative sample in the provinces. Sindh was divided into 17 administrative units or districts and Punjab comprised of 34 districts. Each district was then subdivided into union councils. These districts were divided into large and small strata based on the population projection of the Bureau of Statistics, Pakistan. A stratum was based on population size, urban, rural or slum, and health care services. From these large and small strata within districts, 10% of the union councils were randomly chosen to be included in the study. From each union council, households (sampling unit) were visited, followed by the systematic sampling approach. The number of households per union council was proportionate to the size of the union council. On the whole, sample size allocation was proportional to the size of the districts within the provinces.

2.2. Study Population and Sample Size

The study population for this survey was a woman of reproductive age with children of selected household. The sample size for KAP household survey was calculated from household and families, especially mothers using simple random sampling techniques. According to census 1998 population of Punjab was 73621290 and Sindh 30439893. The final sample size of 9,701 households was proportionately distributed for Punjab (70%) and Sindh (30%).

2.3. Pretesting & Training

A series of pre-tests were conducted, both in rural and urban populations, to identify any necessary changes required in the questionnaire, and to understand and test the conceptual clarity of the instrument. Following the pre-testing, the final

questionnaire and data collection strategies were developed. The questionnaire took approximately 30 minutes to administer.

A three days training was provided to the field staff under the supervision of the survey supervisor and senior research team members. The training included an introduction to the survey, objectives and methodology, conceptual clarity of the instrument, field data collection procedures, general survey instructions and mock interviews. As part of this training, a one day field visit was also organized for field experience before the start of field activities. After this, a review session was organized for the trainees that provided an opportunity for the teams to discuss and share their relevant experiences faced during fieldwork.

2.4. Data Collection Process & Iodine Content Estimation of Household Salt

An introductory meeting with the community gate keepers or influential individuals of the respective union councils was organized to brief them about the survey objectives and activities and to obtain their concurrence prior to data collection. Once the community granted consent, field activities were started in the target union councils of the districts. The households were selected according to the selection methodology and with the help of community facilitators. The data collectors visited pre-decided numbers of households per day in each district.

The data collectors obtained verbal consent from the family and pretested standardized questionnaire was administered in every selected household and the respondents (woman of a reproductive age) were asked questions regarding salt purchasing and consumption habits, salt uses, iodised salt awareness, and media habits.

Rapid iodised salt test kit was also used in survey to assess iodine content in salt used in household. The kit tests salt with drops of stabilized starch based solution, which causes chemical reaction manifested by color change. The salt sample was taken in a teaspoon, and after shaking the reagent (test solution) bottle well, a drop of the test solution was poured on the salt. The salt will turn light blue to dark violet depending on the iodine content of the salt. To assess the iodine content, the color of the salt was compared with chart (0, 15, 25, 50 and 75 parts per million, ppm). The cut-off proportion of 15 PPM and above was considered as adequately iodised salt using the WHO/UNICEF reference indicators for monitoring of iodised salt.

2.5. Data Management and Analysis

Prior to data entry, all forms were checked for completeness and consistency as well as appropriate coding. In case of inconsistency or missing responses, the editors flagged the errors or omissions and consulted the interviewers for possible explanations. For data entry, databases and entry screens were developed using Microsoft FoxPro, and the statistical package for social sciences (SPSS Version 15) was used for data analysis. The entry screens employed a range and consistency checks to minimize entry of erroneous data and a sub sample of the data was manually checked to examine data entry errors and to monitor error rates of data entry operators.

2.6. Ethical Approval

This study was approved by the Ethical Review Committee of Aga Khan University, Pakistan. Verbal consent was obtained from the participants prior to data collection.

3. RESULTS

Of the 9,701 households surveyed, 42% of the respondents were illiterate, 14.3% were educated up to grade 5 and 16% had grade 10 education. The average

respondent age was 33 years and average family size was 7. The average monthly income per household was 9,462 Pakistani rupees (1 US dollar = 94 Pak rupees, on August 15, 2012). The key findings from the interviews are as follows:

The results of multivariate logistic regression analysis revealed that in comparison to urban areas, rural households were more likely not to use of iodised salt (adjusted odds ratio (AOR) =1.38, 95% CI 1.16-1.62), and Sindh was less likely not to use of iodised salt as compare to Punjab (AOR =0.81, 95% CI 0.69-0.96) (Table 1).

In addition, results also revealed that illiteracy (AOR =1.61, 95% CI 1.28-2.04), no knowledge of iodised salt (AOR =2.09, 95% CI 1.44-3.04), non-availability of iodised salt (AOR =2.93, 95% CI 2.10-4.07), unawareness about the advantages of use of iodised salt (AOR =1.97, 95% CI 1.65-2.36) were the main associated factors with non-use of iodised salt for cooking at household levels in Sindh and Punjab provinces, Pakistan (Table 1).

Overall, 85.3% of the respondents mentioned that they heard about iodised salt. The level of awareness was highest among respondents in urban Punjab about

Table 1: Multivariate Analysis for Associated Factors with Non-Use of Iodised Salt

Covariates	OR	Confidence Interval		Adjusted OR	Confidence Interval	
		95% lower	95% upper		95% lower	95% upper
Place of residence						
Rural	2.39	2.12	2.70	1.38	1.16	1.62
Province						
Sindh	0.62	0.56	0.70	0.81	0.69	0.96
Education						
No education	6.44	5.49	7.54	1.61	1.28	2.04
Primary/Secondary	2.49	2.16	2.86	1.30	1.06	1.58
Higher	1			1		
Household monthly Income (Pak Rupee)						
< 10,000	3.47	2.60	4.64	0.82	0.55	1.23
10,000-20,000	1.30	0.96	1.76	0.70	0.46	1.05
21,000-30,000	0.93	0.65	1.32	0.56	0.34	0.92
> 30,000	1			1		
Cost of salt	0.62	0.60	0.63	0.65	0.64	0.67
No knowledge of iodised salt	6.26	4.64	8.44	2.09	1.44	3.04
Non availability of iodised salt	7.67	5.83	10.09	2.93	2.10	4.07
Non awareness about advantages of use of iodised salt	3.36	2.98	3.79	1.97	1.65	2.36

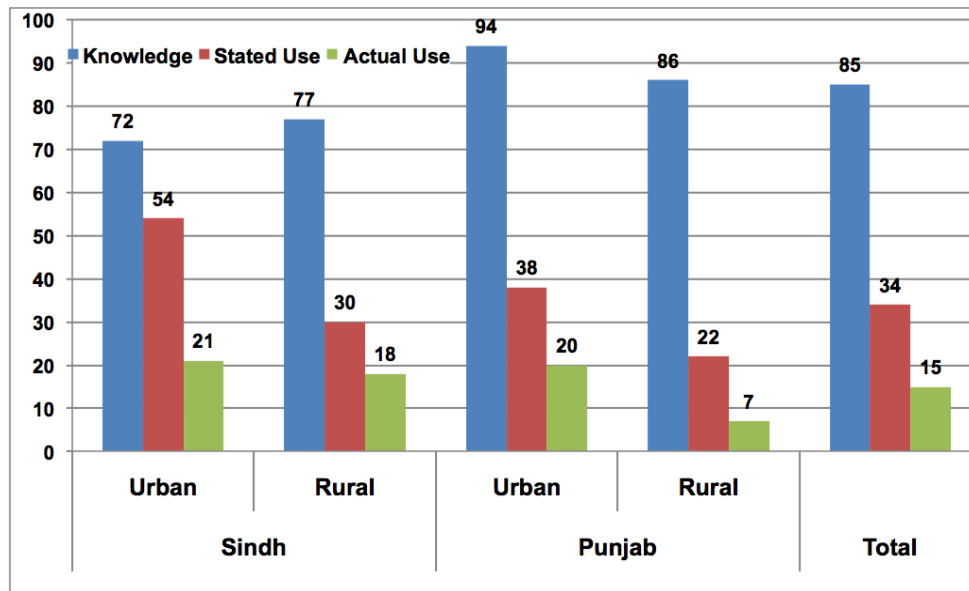


Figure 1: Comparison of knowledge about iodised salt with stated and actual use.

94%. Based on respondent reporting 22-54% of households said iodised salt was purchased and used in the home across both provinces. However, following testing of household salt samples, the actual use of iodised salt (> or = 75 ppm) was found to be only 15%. Actual use of iodised salt was found to be higher in urban areas of both provinces (21-20% in Sindh and Punjab respectively) than in rural areas (18% and 7% in Sindh and Punjab respectively) (Figure 1).

Across each district there was considerable variation among knowledge and actual uptake of iodised salt at household level. Knowledge and actual use of iodised salt was highest in one urban and one rural district of Sindh (Karachi 84%, 32.3%) and (Badin 73.2%, 28.2%) and two urban districts of Punjab (Lahore 93.2%, 30.5%) and (Rawalpindi 95.7%, 27%) respectively. Actual uptake of iodised salt was very low in five rural districts of province Sindh (Umerkot, Dadu, Thatta, Nawab Shah, and Khairpur) ranges from 4% to

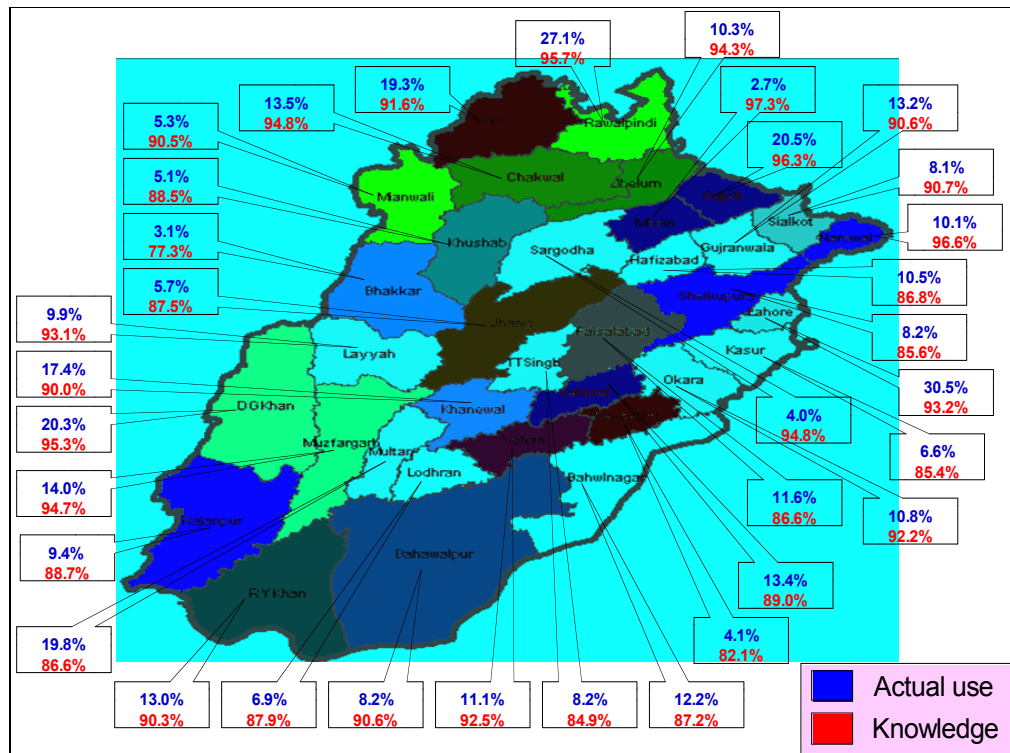


Figure 2: District-wise comparison with knowledge about iodised salt and actual use in Province Punjab.

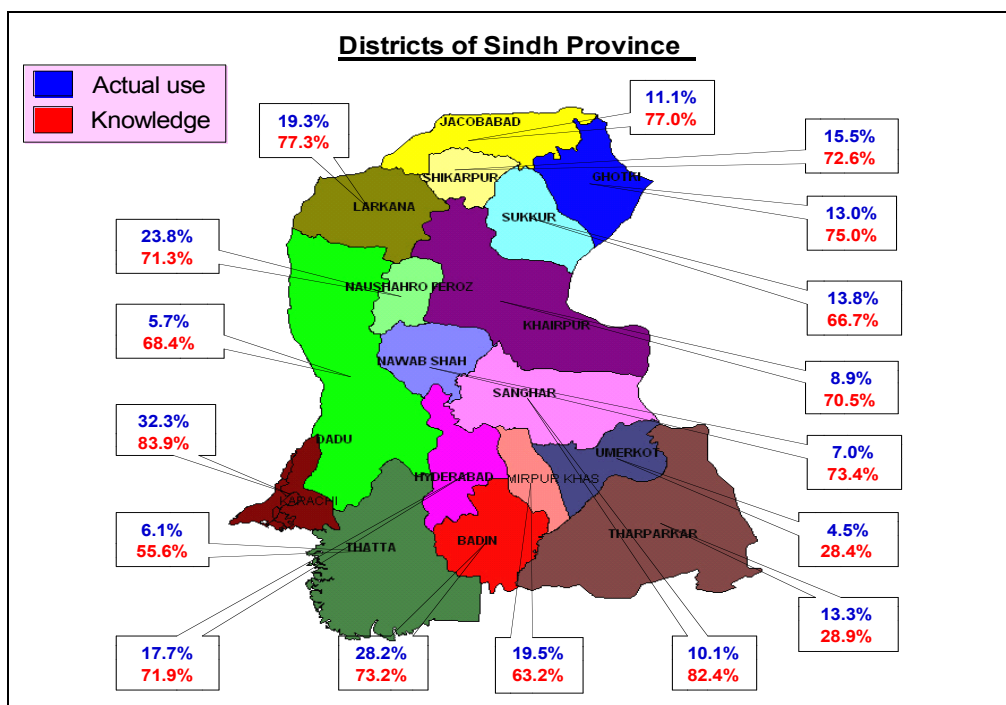


Figure 3: District-wise comparison with knowledge about iodised salt and actual use in Province Sindh.

9% and similar situation in 14 rural districts of province Punjab (Multan, Bhakkar, Sargodha, Pakpatten, Khushab, Mianwali, Jhang, Kasur, Lodhran, Sialkot, Sheikupura, Toba Tag Singh, Bahawalpur, and Rajanpur) from 2.7% to 9.4% (Figures 2, 3).

Table 2 showed knowledge about the advantages of use of iodised salt. Nearly 17% respondents in Sindh and 42% in Punjab indicated that the intake of iodised salt is important because it prevents from goiter, whereas 17% and 21% respondents indicated that it is good for better physical growth in Sindh and Punjab respectively. About 59% respondents in Sindh and

37% in Punjab were not aware about the advantages of use of iodised salt.

Regarding reasons of occasional or never use of iodised salt, majority of the respondents mentioned its high price (31.4% and 31%) and unavailability (42.7% and 25.4%) in the area (Table 3). The average price of iodized salt was 11 rupees or (US \$0.14) per kilogram. Similarly, price of common salt was 4 rupees or (US \$0.05) per kilogram. The cost difference between these two kinds of salts was 7 rupees or (US \$0.08), equal to the price of an egg.

Table 2: Knowledge About the Advantages of Use of Iodised Salt

Knowledge about the advantages of use of iodised salt	Province Sindh			Province Punjab		
	Urban %	Rural %	Total %	Urban %	Rural %	Total %
Prevention from goiter	19.7	13.4	17.1	46.2	37.7	42.2
Better physical growth	16.8	18.3	17.4	23.6	18.0	20.9
Prevention from cretinism	1.3	3.7	2.3	1.4	0.5	1.0
Prevention from abortion/stillbirth	1.9	5.8	3.5	1.0	0.9	1.0
Better brain/mental development	9.5	7.5	8.7	4.8	3.8	4.4
Better educational performance	1.8	2.8	2.2	1.1	0.4	0.8
Prevention from birth defects	2.2	3.3	2.7	1.1	1.2	1.2
Prevention from defects of speech & hearing	4.1	5.6	4.7	2.6	1.5	2.1
Others	4.8	6.2	4.5	8.2	12.0	9.6
Don't know	60.7	56.0	58.7	33.3	41.8	37.3

Table 3: Reasons of Never & Occasional Use of Iodised Salt

Reasons	Occasional use n (%)	Never use n (%)
Expensive	177 (31.4 %)	1679 (31.0 %)
Not always available	241 (42.7)	1378 (25.4 %)
Bad taste	87 (15.4 %)	644 (11.9 %)
Control births	1 (0.2 %)	360 (6.6 %)
Others	32 (5.6 %)	915 (16.9 %)
Don't know	26 (4.6 %)	448 (8.3 %)
Total – n	564	5424

4. DISCUSSION

Salt iodization was recommended by the WHO/UNICEF/ICCIDD for eradication of iodine deficiency disorders, which is one of the most effective public health interventions [27]. The survey collected information on the type of salt consumed, the iodine content in salt at the household level, as well as knowledge, attitude and practices regarding use of iodised salt. The survey revealed a high level of knowledge about iodised salt (85%) but low level of use due to its high price (31%), unavailability (25%) and misconception (7%). Similar findings were reported in National Nutrition Survey of Pakistan 2001-02 [28].

The program of IDD elimination comprises the assessment of IDD situation, salt production, knowledge, social mobilization, and promotion of iodised salt [29]. Testing of the available household salt by using rapid test kits for iodine revealed that ordinary salt is being sold as iodised salt. Although 34% of the respondents mentioned they had ever used iodised salt, only 15.3% of current salt samples taken from their homes were iodised. The proportion of households using adequately iodised salt was highest in urban areas of Sindh (21%) and lowest in the rural areas of Punjab (7%). Similar finding were reported in Balochistan multiple indicators cluster survey (MICS) report, 2004 and PSI, UNICEF supports social marketing strategy to help eliminate iodine deficiency in Pakistan 2007, and rapid survey of status of salt iodization and urinary iodine excretion levels in Karnataka, India [30-31]. Across each district of Sindh and Punjab, there was considerable variation among knowledge and actual uptake of iodised salt at household level ranges from (28.4% - 97.3%) and (2.7% - 32.3%) respectively. There were three types of iodised salt users: exclusive users, occasional users, and users of both iodised and non-iodised salt.

The results of our survey showed that the respondents were not well informed about the

advantages of using iodised salt in prevention of IDD. Most of them were familiar with goiter, while 17.1% of the respondents in Sindh and 42.2 % in Punjab mentioned that use of iodised salt helped to prevent goiter. The main sources of information was television 74.8% in rural areas and 76% in urban areas respectively, while health professionals were the least quoted sources of information about iodised salt. This information is important for developing better awareness campaigns to increase uptake of iodised salt.

5. CONCLUSIONS

Iodised salt usage was very low in Sindh & Punjab provinces of Pakistan. Most of households were likely to purchase iodised salt, if they understood the benefits derived from iodised salt. High rates of use of mass media and the perceived importance of health care providers especially doctors with regards to messages; indicate great potential in scaling up the use of iodised salt in Pakistan.

In order for successful sustainable elimination of IDDs, it is necessary that government should develop a National Plan for elimination of IDD from the country and it should be incorporated in the health master plan and universal salt iodization legislation at the earliest.

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CONFLICT OF INTEREST

The authors declared no conflict of interest.

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