Vol 3 | Issue 4 | October - December | 2023

ORIGINAL ARTICLE - PUBLIC HEALTH

IODINE ESTIMATION IN SALT SAMPLES: A SECONDARY DATA ANALYSIS OF TRENDS FROM 2017 TO 2023 IN TAMIL NADU

Shinu Priya R [(1)], Shanmugasundaram V [(1)], Selvavinayagam T S [(1)]

(1) Directorate of Public Health and Preventive Medicine, Chennai.

Abstract

INTRODUCTION: Iodine deficiency is a global public health concern that can have severe consequences, including goiter and intellectual disabilities. Iodine fortification of salt is a widely adopted strategy to address this issue. This study analyzes trends in iodine estimation in salt samples in Tamil Nadu, India, from 2017 to 2023 to assess the effectiveness of iodization programs.

OBJECTIVES: The study aimed to quantitatively assess the iodine content in salt samples, determine changes in salt iodine content over seven years, and identify regional disparities in iodine levels within Tamil Nadu.

MATERIALS AND METHODS : It is a secondary data study. Salt samples were collected according to the National Iodine Deficiency Disorders Control Program (NIDDCP) guidelines. Samples were drawn from various sources, including rural and urban households and retailers, and analyzed using the iodometric titration method. Health inspectors collected salt samples, and iodine content was quantified in parts per million (ppm) using the iodometric titration method.

RESULTS : The study revealed a significant increase in adequately iodized salt from 66% to 96% over the study period. However, only 79% of salt samples contained iodine above 15 ppm, suggesting room for improvement. The study aligns with the National Family Health Survey (NFHS) data, which shows national and state-level improvements in salt iodization.

CONCLUSION : While progress in salt iodization is evident, regional and rural-urban disparities persist. Localized strategies in underperforming areas, sustained monitoring, targeted outreach, public awareness campaigns, and collaboration among stakeholders are recommended to ensure consistent iodine levels in salt and bridge disparities.

KEYWORDS : Iodine deficiency, salt iodization , NFHS, iodization programs.

INTRODUCTION

Iodine deficiency is a critical public health concern with far-reaching implications for human well-being. Globally two billion people are at risk of iodine deficiency disorders due to insufficient iodine intake.[1] Adequate iodine intake is essential for the proper functioning of the thyroid gland, which regulates various bodily functions, including metabolism. Iodine deficiency can lead to severe health issues, including goiter and intellectual disabilities, making it a significant global health challenge.[2]

To combat this issue, iodine fortification or enrichment of salt has been widely adopted as an effective and affordable strategy to ensure a stable and sufficient iodine intake at the population level. In this context, monitoring the iodine content of salt samples is of paramount importance to assess the progress and efficacy of iodine enrichment programs.[3]

This study focuses on the iodine estimation in salt samples and aims to provide an in-depth analysis of the trends observed in Tamil Nadu, India, from the year 2017 to 2023. Salt sample analysis is a crucial indicator of the success of iodine enrichment programs and can shed light on the extent to which the population's iodine needs are being met.

Tamil Nadu, a state in southern India, has been proactive in addressing iodine deficiency and has implemented various initiatives to ensure the adequate iodization of salt. This research delves into the data collected through salt sample analysis in Tamil Nadu over the specified timeframe, with a primary focus on assessing the proportion of adequately iodized salt (defined as having an iodine content of >15 ppm) and non-iodized salt (0 ppm).

Understanding the trends in salt sample analysis will provide valuable insights into the progress of iodine enrichment efforts in Tamil Nadu. Moreover, it will help identify regions where additional interventions may be required to reach the target levels of salt iodization. This study contributes to the broader conversation surrounding public health and nutrition by offering a comprehensive analysis of the iodine estimation in salt samples in a specific geographical context.

OBJECTIVES

1. To quantitatively assess the iodine content in salt samples collected from various regions of Tamil Nadu during

Please Scan this QR Code to
View this Article Online
Article ID: 2023:03:04:01
Corresponding Author: Shinu Priya R
e-mail : shinupriya08@gmail.com

the period from 2017 to 2023

2. To determine whether significant changes or trends in salt iodine content have occurred over seven years, shedding light on the effectiveness of ongoing iodization programs and their impact on public health.

3. To identify and understand regional disparities in salt iodine levels within Tamil Nadu, pinpointing areas with inadequate iodine supplementation and those that demonstrate effective iodization practices, enabling targeted interventions as needed

METHODOLOGY

Methodology for Iodine Deficiency Disorder (IDD) Study – Secondary Data Analysis

This methodology outlines the procedures for conducting a secondary data analysis study aimed at evaluating iodine levels in salt samples, collected in accordance with the Government of India's National Iodine Deficiency Disorders Control Program (NIDDCP) guidelines of October 2006.

SAMPLE COLLECTION : Salt samples are systematically collected on a quarterly basis, with each Health Unit District (HUD) being tasked with obtaining a total of 200 salt samples annually. These samples are drawn from different categories, including 25 from rural households, 15 from urban households, 7 from rural retailers, and 3 from urban retailers. Proper labeling of each sample is imperative.

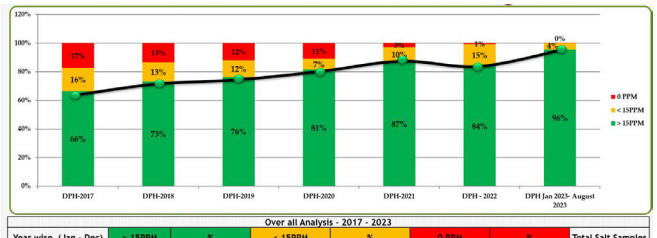
DATA COLLECTION TEAM : Health inspectors from the respective District Department of Health Services (DDHS) are the primary personnel responsible for the collection of salt samples. Technical Personal Assistants (PAs) to each DDHS assume a pivotal role in overseeing the entire process, monitoring compliance, and ensuring the timely dispatch of salt samples to the state IDD monitoring lab in accordance with the quarterly schedule.

ANALYSIS OF IODINE CONTENT : Iodine content in the salt samples is quantified in parts per million (ppm) utilizing the iodometric titration method. This process entails several steps. First, concentrated sulfuric acid (H_2SO_4) is introduced to the salt samples, liberating free iodine from the iodate. Excess potassium iodide (KI) is subsequently added to solubilize the free iodine, which is then titrated using sodium thiosulfate. The amount of thiosulfate consumed correlates with the liberated free iodine. Starch is introduced as an external indicator, reacting with free iodine to produce a distinctive blue color.

RESULT DISSEMINATION : The results, expressed in ppm, are communicated to the respective DDHS for further action. In instances where salt samples test below the critical threshold of 15 ppm, instructions are issued to the DDHS to actively raise awareness in the districts regarding the crucial importance of adequate salt iodization.

DATA RETRIEVAL : As this study involves a secondary data analysis, the results of the iodine content analysis, which are sent to the DDHS, are also sent to the state Iodine Deficiency Disorders Control Programme (IDDCP) cell in Excel format which is in the Directorate of Public Health and Preventive Medicine (DPHPM). This data, retrieved from the Excel files at the IDDCP cell in DPHPM, serves as the basis for the secondary data analysis conducted in this study.

RESULTS



Over all Analysis - 2017 - 2023

Year wise (Jan - Dec)	> 15PPM	%	< 15PPM	%	0 PPM	%	Total Salt Samples
DPH-2017	3120	66%	753	16%	820	17%	4693
DPH-2018	10708	73%	1972	13%	1968	13%	14648
DPH-2019	4054	76%	621	12%	642	12%	5317
DPH-2020	1453	81%	133	7%	197	11%	1783
DPH-2021	2758	87%	322	10%	90	3%	3170
DPH - 2022	4122	84%	743	15%	36	1%	4901
DPH Jan 2023- Aug 2023	5122	96%	238	4%	2	0%	5362
Total	31337	79%	4782	12%	3755	9%	39874

Figure 1 : Salt sample analysis chart from 2017 - August 2023

The Trend of salt sample analysis from 2017- August 2019 for the estimation of iodine in the salt using iodometric titration method shows that the proportion of adequate level iodized salt which is 15ppm has been increased from 66% to 96% and the percentage non iodized salt, which is 0ppm has been reduced from 17% to 0%.

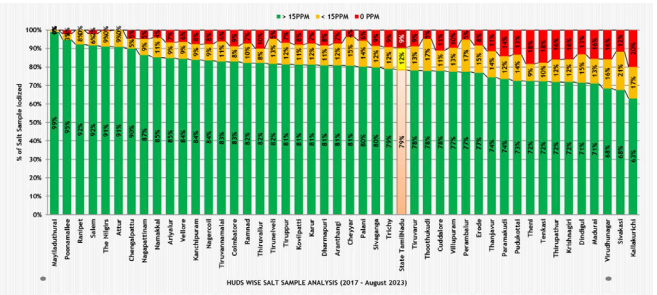


Figure 2 : HUD wise salt sample analysis (2017 - August 2023)

The Tamilnadu state average of the Salt sample analysis for the estimation of levels of iodine from 2017 - August 2023 shows, 91% 0f salt samples tested are iodized. But only 79% of the Salt sample contains adequate level of iodine, which is >15ppm. About 18 out of 45 HUDs are below the state average level of salt iodization.

DISCUSSION

The study spans from 2017 to August 2023, demonstrates a significant and positive change in iodine levels within salt samples collected from various regions in Tamil Nadu.

The proportion of adequately iodized salt (with more than 15 ppm of iodine) increased impressively from 66% to 96%.

This increase underscores the effectiveness of iodization programs in improving salt iodine content, aligning well with the goal of reducing iodine deficiency disorders.

It's worth noting, though, that while 91% of salt samples were iodized, only 79% contained adequate iodine levels, suggesting a need for further improvement.

The NFHS 5 data4 for 2019-2021 and 2020-2021 provides a broader, national perspective on iodine sufficiency in India and Tamilnadu. The survey reports that in 2019-2021, 94.3% of salt samples in India were iodized.

Urban areas exhibited higher rates of iodization at 96.9%, while rural areas also demonstrated iodization at 93%. In NFHS 5 Tamil Nadu 2020-2021, the overall iodization rate remained high at 92%, with urban areas at 95% and rural areas at 89.3%.

The comparison of the current study with NFHS 5 data reveals several important insights. Firstly, the study's results demonstrate an upward trend in salt iodization within Tamil Nadu, signifying the effectiveness of iodization programs. This complements the national NFHS 5 data, which indicates a robust iodization trend across the entire country.

However, regional disparities are evident. The present study highlights the need for improving iodine content levels in Tamil Nadu, as only 79% of salt samples met the recommended iodine threshold. With the exception of Attur, Myladudurai, Nilgiris, and Ranipet, all other 41 HUDs reported 0PPM in salt samples, indicating non-iodized salt. Even major salt-producing regions like Thoothukudi reported 0PPM in salt sample analysis.

Additionally, it's important to highlight that a significant portion of 0PPM salt samples is attributed to non-edible salt consumption, forming a substantial component of non-iodized salt in the region. This suggests that while iodization programs have raised the prevalence of iodized salt, ensuring the consistent iodine content remains a challenge.

NFHS 5 data further reveals variations between urban and rural areas, indicating the importance of bridging this gap. While urban areas demonstrate higher iodization rates, rural regions exhibit slightly lower rates.

This discrepancy underscores the need for continued efforts to ensure that rural populations have equal access to iodized salt to reduce regional disparities.

This the current study and the NFHS 5 data collectively reflect significant progress in iodized salt usage within India, with the study illustrating a positive trend in Tamil Nadu.

However, they also underscore the importance of maintaining consistent iodine levels in salt, particularly in rural areas, to ensure comprehensive iodine sufficiency across the nation. These findings collectively signify a positive direction toward reducing iodine deficiency disorders and advancing public health in India.[4]

CONCLUSION

While progress in salt iodization is evident, regional and rural-urban disparities persist. Localized strategies in underperforming areas, sustained monitoring, targeted outreach, public awareness campaigns, and collaboration among stakeholders are recommended to ensure consistent iodine levels in salt and bridge disparities.

RECOMMENDATIONS :

1. Given the regional disparities in iodine enrichment levels within Tamil Nadu, it is recommended to implement localized strategies in underperforming Health Unit Districts (HUDs).

2. Sustained monitoring of salt iodization efforts is essential to maintain consistent iodine content levels in salt samples

3. Collaborative efforts between public health authorities, salt producers, and research institutions should be fostered to address iodine enrichment challenges effectively. Additionally, further research should be conducted to explore the reasons behind the regional disparities and the best practices for improving salt iodization in underperforming areas.

LIMITATIONS :

The findings of the study are based on statistical analysis and do not account for qualitative aspects such as consumer preferences, cultural factors, and local practices that may influence salt usage.

REFERENCES :

1. de Benoist B, McLean E, Andersson M, Rogers L. Iodine deficiency in 2007: global progress since 2003. Food Nutr Bull. 2008;29:195-202.

2. National iodine deficiency disorders control programme: current status & future strategy. IndianJMedRes.2018;148(5):503510.doi:10.4103/ijmr.

IJMR_1717_18.

3. National iodine deficiency disorder control programme (NIDDCP) in India: current status and failure strategies. J Indian Thyroid Soc. 2007;4(2):37-49.

4. National Family Health Survey [Internet]. rchiips.org. [cited 2023 Nov 6]. Available from: http://rchiips.org/nfhs