

**Screening of Iodine Deficiency Disorder (IDD) among Pregnant Women in
District Hospital of Sindhupalchowk, Nepal**

Submitted to

**Society for Eliminating Nepalese Iodine Deficiency (SENID)
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**Public Health and Infectious Disease Research Center (PHIDReC)
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Summary

Iodine deficiency affects children impairing their mental and motor functions, and manifestations range from small neurological changes, to impaired learning ability. Therefore, this study was designed to determine the status of Iodine Deficiency Disorders (IDD) among pregnant women who are at risk of IDD. A total of 98 pregnant women from Chautara Hospital Sindhupalchowk were included in the study. Urine samples were collected from pregnant women. The urine samples were analyzed for urine iodine estimation. Using WHO criteria of urinary iodine excretion for pregnant women, 28.6% (28 women) had severe iodine deficiency, 31.6% (31 women) had adequate iodine nutrition, 34.7% (34 women) had risk of iodine induced hyperthyroidism, and 5.1% (5 women) had risk of adverse health consequences. This evidence shows that still significant proportion of women (one fourth) in Nepal had severe iodine deficiency and there is the need of effective intervention and awareness programme of iodine in this risk population.

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Introduction

Iodine Deficiency Disorder (IDD) is the world's single most significant cause of preventable brain damage and mental retardation. Twenty nine percent of the population (1570 million people) is at risk of iodine deficiency today in the world. The immense danger to health due to IDD arises from the fact that these disorders can began even before the child is born. Although iodine is needed in small amount on an average of 150 mcg (100 to 300) per person per day,^{1,2} lack of iodine is associated with wide range of clinical and sub-clinical conditions. The most obvious sign of IDD is goiter, which is a gross enlargement of the thyroid gland in the neck, with a global prevalence of 12%. In addition to goiter, IDD leads to infant mortality, stillbirths, birth complications, mental retardation and depressed psychomotor functions. Moderate IDD in early childhood has been estimated to lower the intelligence quotient by about 10-15 points, while in adults it causes lethargy.³

IDD is an important major micronutrient deficiency problem in Nepal. In some isolated mountainous area of Nepal, most of the adult woman had goiter and up to 10% of population were cretins, the severest form of IDD.⁴ IDD status assessment conducted in 2004 in Nepal noted that 16.3 percent household salt samples were found to have less than 15 ppm iodine, 35.33 percent samples found to have 15 to 30 ppm, 40 percent samples were found to have 30-50 ppm and 12.64 percent salt samples had iodine greater than 50 ppm.

In areas with severe iodine deficiency (<50 mcg intake/day), goitrogenesis as well as hypothyroidism were frequently observed in mother and newborn as a result of the inability of the thyroid gland to adjust to changes in thyroid economy associated with pregnancy. Hence, the pregnant woman and the newborn have been considered primary targets for iodine supplementation in such areas.⁵ Ministry of Health and Population has prioritized Iodine Deficiency Disorders as a high level activity in its Nutrition Policy and Strategy 2004. By the year 2017 iodine deficiency disorders will be eliminated virtually from Nepal.⁷

We implemented iodine supplementation among pregnant mothers in Antenatal Care (ANC) Clinic of Chautara Hospital Sindhupalchowk. We found significant positive outcome in mothers and children born from iodine supplemented mothers.

All these findings associated with pregnant women justify the burning issue for the research on iodine deficiency disorders among pregnant mother and newborn. With these motivations, this study was designed to screen among pregnant women in Chautara Hospital Sindhupalchowk in 2012 analyzing urinary iodine. This study also provided health education to the women of rural community regarding the use of two children logo containing iodized salt.

Objectives

General objective

To determine the status of Iodine Deficiency Disorders (IDD) in pregnant women in Chautara Hospital Sindhupalchowk.

Specific objectives

1. To determine the status of IDD among pregnant women analyzing urinary iodine excretion.
2. To provide health education to pregnant mothers and mother's group in the rural community regarding iodized salt and IDD.

Methodology

3.1 Research design

This cross-sectional study was conducted to determine the status of IDD among pregnant mothers in Chautara Hospital Sindhupalchowk from January 2012.

3.2 Study site

The site of this study was Chautara Hospital Sindhupalchowk. Sindhupalchowk district was situated in hilly ecological region of Central region of Nepal.

3.3 Sample size and selection of pregnant women

We enrolled 98 pregnant mothers in Sindhupalchowk district hospital, who attended for antenatal care from January to June 2012.

3.4 Collection of urine samples

Urine samples were collected from 98 pregnant women in each hospital for the analysis of Urinary Iodine Excretion (UIE) to screen IDD status. The urine samples were collected in clean leak proof container. The collected urine samples were kept in refrigerator at -20⁰C until analysis. The UIE analysis was conducted at BP Koirala Institute of Health Sciences (BPKIHS), Dharan.

3.5 Health education on iodine to pregnant women

After obtaining the result of urinary iodine, pregnant women were counseled and health education was provided regarding importance of iodine during pregnancy. We also assessed mother's knowledge on IDD. Health education was provided to 150 women including 98 pregnant mothers in the hospital.

3.6 Data collection

Knowledge on iodine and IDD, perceptions of mothers on iodized salt was collected from mothers using questionnaire. The UIE test data was collected after sample analysis. The descriptive qualitative information regarding the mother's perceptions on iodized salt was collected through interview.

3.7 Validity and reliability

Validity and reliability of the study was considered with high priority to minimize the respective errors. Standard techniques were used for urine sample collection. Training and orientation for health workers were conducted as per need.

3.8 Data management and analysis

Collected data were entered into SPSS version 13 and analyzed. Descriptive analysis was conducted. The following classification of urinary iodine excretion (UIE) for pregnant women was used.

Table 1: WHO classification of iodine deficiency disorders (IDD) on the basis of urinary iodine excretion for pregnant women

Median Urinary Iodine ($\mu\text{g/L}$)	Iodine intake	Iodine status
<150 $\mu\text{g/L}$	Insufficient	Severe iodine deficiency
150-249 $\mu\text{g/L}$	Adequate	Adequate iodine nutrition
250–499 $\mu\text{g/L}$	Above requirements	Risk of iodine induced hyperthyroidism
≥ 500 $\mu\text{g/L}$	Excessive	Risk of adverse health consequences

Results

4.1 Demographic characteristics of women involved in the study

Among total 98 pregnant women, majority (76.5%) were in the age group 21-35 years. The mean age of women was 23.4 years. Among them, 11.2% were illiterate and 25.5% had higher secondary and above level education. Only a few mothers (3.1%) were employed and most of them were 96.9%. About 43% of women had no child and that was the first pregnancy whereas 35.7% had the second pregnancy. About one tenth (11.2%) pregnant women had still birth history in previous pregnancy.

Table 2: Demographic characteristics of the women

Characteristics	Number	Percent
Age distribution (in years)		
< or equal to 20	22	22.4
21-35	75	76.5
More than 35	1	1.0
Mean age (S.D.)	23.4 (3.9)	
Education level		
Illiterate	11	11.2
Primary level	31	31.6
Lower secondary level	18	18.4
Secondary level	13	13.3
Higher secondary and above level	25	25.5
Occupation of women		
Housewife	95	96.9
Employed	3	3.1
Occupation of husband		
Agriculture	9	9.2
Business	11	11.2
Daily labour	17	17.3
Government employee	35	35.7
Private employee	19	19.4
Student	6	6.1
Social service	1	1.0
Number of child		
No child	43	43.9
One child	35	35.7
Two or more than two children	20	20.4
Still birth in previous pregnancy		
Yes	11	11.2
No	87	88.8

4.2 Knowledge of iodine and IDD among pregnant women

Still, 28.6% of women had not heard about iodized salt. However, the use of iodized salt in the households was 91.8%. About 43% pregnant women did not take iron/folic acid tablets during pregnancy. This proportion includes the pregnant women who came to the hospital for the first time.

Table 3: Iodine related information

Characteristics	Number	Percent
<i>Hear about iodized salt</i>		
Yes	70	71.4
No	28	28.6
<i>Use of iodized salt in household</i>		
Yes	90	91.8
No	8	8.2
<i>Use of iron/folic acid tablets during pregnancy</i>		
Yes	56	57.1
No	42	42.9

4.3 Urinary iodine level among pregnant women

Using above mentioned criteria, among the 98 urine samples analyzed at Department of Biochemistry, BPKIHS, Dharan, 28.6% (28 women) had severe iodine deficiency, 31.6% (31 women) had adequate iodine nutrition, 34.7% (34 women) had risk of iodine induced hyperthyroidism, and 5.1% (5 women) had risk of adverse health consequences.

Table 4: Urinary iodine excretion level and iodine intake status

UIE level ($\mu\text{g/l}$)	Number	Percent
Insufficient (<150)	28	28.6
Adequate (150-249)	31	31.6
Above requirements (250-499)	34	34.7
Excessive (>500)	5	5.1

Regarding agewise distribution of urinary iodine excretion, the insufficient iodine level was found in the age group 21-35 years (30.7%) and less than 20 years of age (22.7%). It is found that more illiterate women (54.5%) had insufficient iodine as compared to literate women. Similarly, among women who had not heard about iodized salt 46.4% had insufficient iodine and among those who did not use iodized salt 62.5% had insufficient iodine.

Table 5: Factors related to IDD

Characters	Insufficient (<150)	Adequate (150-249)	Above requirements (250-499)	Excessive (>500)
<i>Age (in years)</i>				
Less than or equal to 20	5 (22.7)	5 (22.7)	11 (50.0)	1 (4.5)

21-35	23 (30.7)	25 (33.3)	23 (30.7)	4 (5.3)
More than 35 years	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)
<i>Education level</i>				
Illiterate	6 (54.5)	4 (36.4)	1 (9.1)	0 (0.0)
Primary level	9 (29.0)	11 (35.5)	9 (29.0)	2 (6.5)
Lower secondary level	9 (50.0)	2 (11.1)	5 (27.8)	2 (11.1)
Secondary level	2 (15.4)	4 (30.8)	7 (53.8)	0 (0.0)
Higher secondary and above level	2 (8.0)	10 (40.0)	12 (48.0)	1 (4.0)
<i>Heard about iodized salt</i>				
Yes	15 (21.4)	24 (34.3)	27 (38.6)	4 (5.7)
No	13 (46.4)	7 (25.0)	7 (25.0)	1 (3.6)
<i>Use iodized salt</i>				
Yes	23 (25.6)	30 (33.3)	32 (35.6)	5 (5.6)
No	5 (62.5)	1 (12.5)	2 (25.0)	0 (0.0)
<i>Consume iron/folic acid</i>				
Yes	18 (32.1)	14 (25.0)	20 (35.7)	4 (7.1)
No	10 (23.8)	17 (40.5)	14 (33.3)	1 (2.4)

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Appendix-I: Study tools

Performa for collection of urine samples from baby

Date:

Newborn baby ID number:

Name of the mother:

Name of the father:

Address: District:

VDC:

Village:

Ward No.:

Name of the Hospital:

1. Age of the mother:
2. Caste:
3. Religion:
4. Weight of the baby:
5. General clinical status of the baby
 - a. Normal
 - b. Not normal
6. Urine sample collected
 - a. Yes
 - b. No

Performa for collection of urine samples from pregnant women

Date:

Name of the mother:

Name of the husband:

Address: District:

VDC:

Village:

Ward No.:

Name of the Hospital:

1. Age of the mother:
2. Caste:

- 3. Religion:
- 4. Weight:
- 5. General clinical status
 - a. Normal
 - b. Not normal
- 6. Urine sample collected in filter paper
 - a. Yes
 - b. No

Mother's Physical Examination Form

ID No. Date of examination:.....

Name of the mother: Age:.....

Name of the children:

Address: VDC/MunicipalityWard No:.....

1. Vitals 5. Other examination if any:

BP

Pulse

Temperature (F)

Height (CM)

Weight (Kg)

BMI

2.General

Skin color, Pallor, Jaundice

Edema

3. Neck:

Thyroid swelling

Stage I

Stage II

Stage III

Lab. Investigation

Blood: HB ...gm%

Name of the enumerator:

Designation:

Name of the Hospital:

Signature:

Location:

Appendix-II: Ethical issues
Information Sheet for Pregnant Women and Parents of Children

Name of Principle Investigator:

Name of Organization: Public Health and Infectious Disease Research Center (PHIDReC)

Name of Sponsor: Society for Eliminating Nepalese Iodine Deficiency Disorder (SENID) Japan

Information sheet for individuals participating in the research

"Screening of Iodine Deficiency Disorder (IDD) and Supplementation of Iodine among Pregnant Women
Chautara Hospital, Sindhupalchowk, Nepal"

(I am and I work at the PHIDReC Kathmandu. We are doing some research on the Iodine Deficiency Disorder to determine its burden in risk population such as pregnant women and children.)

Purpose of the research

Iodine Deficiency Disorder (IDD) is an important major micronutrient deficiency problem in Nepal. In areas with severe iodine deficiency (<50 mcg intake/day), goitrogenesis as well as hypothyroidism were frequently observed in mother and newborn as a result of the inability of the thyroid gland to adjust to changes in thyroid economy associated with pregnancy. Hence, the pregnant woman and the newborn have been considered primary targets for iodine supplementation in such areas.

All these findings associated with pregnant women justify the burning issue for the research on iodine deficiency disorders among pregnant mother and newborn. With these motivations, this pilot study has been designed to screen IDD in children born from iodine supplemented mothers during pregnancy and pregnant mothers testing TSH in order to implement iodine supplementation in pregnant women.

Procedures

The site of this study is Chautara Hospital Sindhupalchowk. We will collect urine samples from 400 pregnant mothers when they seek ANC. We also assess knowledge and perceptions of mothers on IDD and iodine. The mothers will also be assessed clinically. Similarly, urine samples will also be collected from newborns from the same hospitals during the study period. Urine samples will be analyzed for urinary iodine excretion using standard procedure.

Risks and Discomforts

There will be no any risks during collection of urine sample. The urine sample will be collected using sterile leak proof container in the hospital when you seek ANC.

Benefits

Your participation is likely to help us to find out more about what is the burden of Iodine Deficiency Disorder (IDD) in high risk population in Nepal and this information will be useful to implement iodine deficiency control programme.

Incentives

You will not be provided any incentive to take part in the research.

Confidentiality

The information that we collect from this research will be kept confidential. Information about you that will be collected from the study will be stored in a file which will not have your name on it, but a number assigned to it. Which number belongs to which name will be kept under lock and key, and will not be divulged to anyone except the researchers, and research sponsors.

Right to refuse or withdraw

You do not have to take part in this research if you do not wish to do so, and this will not affect the future treatment of your family at the health facility at the District Hospital in any way. You will still have all the benefits that you would otherwise have.

You may stop participating in the research at any time that you wish to, without losing any of your rights as a patient or otherwise.

Who to contact

If you have any questions you may ask those now or later. If you wish to ask questions later, you may contact: (Prof. Chitra Kumar Gurung, PHIDReC, Kathmandu, Phone: +977-1-4494254).

Consent Form from Pregnant Women for Urine Sample Collection for IDD Screening

I have read/has been read to me the foregoing information. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this study and understand that I have the right to withdraw from the study at any time without in any way affecting me and my family as a health care seeker.

Participant's Name:

Signature:

Place:

Date:

Witness (Name):

Place:

Signature:

Date:

Appendix-III: Urinary iodine data

List of mothers and their UIE from Sindhupalchowk District Hospital

S.N.	Name of the interviewee	Age (years)	Urinary Iodine Excretion(UIE)
1	Gopini Thakuri	29	151.242
2	Rama Tirwa	21	54.405
3	Mira Acharya	26	120.295
4	Laxmi Mahat	20	325.312
5	Radhika Bhujel	29	177.675
6	Binita Nepali	21	248.994
7	Ganaga Neupane	23	403.402
8	Sabina Thapa	21	398.643
9	Sharmita Gadraj	21	30.200
10	Laxmi Shrestha	24	212.126
11	Kumari Shrestha	22	26.654
12	Shova Basnet	24	480.430
13	Sujata Dulal	22	517.050
14	Nirmala Devi Das	21	130.916
15	Sushila Shrestha	21	261.671
16	Pan Maya Lama	23	93.073
17	Mana Ghale	19	498.479
18	Kalpana Rana	23	160.368
19	Saru Shrestha	21	179.420
20	Sita Basnet	32	319.692
21	Tul Maya Shrestha	31	226.028
22	Mina Nepali	35	101.572
23	Laxmi Shrestha	27	109.597
24	Nirmala Giri	30	122.466
25	Beli B.K.	26	160.368
26	Saru Basnet	24	510.700
27	Sushma Lama	24	122.466
28	Kamala Tamang	30	150.938
29	Anita Shrestha	?	142.435
30	Nirmala B.k.	24	173.573
31	Karishma Shrestha	19	123.810
32	Suntali Tamang	25	250.779
33	Rita Shrestha	19	335.964
34	Sabitr Giri	26	223.034
35	Arpana Thapa	25	332.047
36	Nisha Tamang	21	63.133
37	Bal Kumari Giri	21	37.248
38	Sima B.K.	22	507.607
39	Rita Shrestha	19	141.437
40	Sita B.K.	23	355.603
41	Poonam Shrestha	24	292.329
42	Kabita Bhandari	20	400.575

43	Sarsawati Thapa	22	161.546
44	Sharada Neupane	22	196.840
45	Sarita Dnagol	23	384.320
46	Sushma Tamang	23	348.251
47	Anju Thapa	20	413.339
48	Yasoda Shrestha	34	178.654
49	Bel Kumari Shrestha	??	164.230
50	Maya Tamang	17	201.460
51	Suntali Bhujel	22	220.297
52	Radhika Ghora Saini	19	150.869
53	Anjana Dhungel	20	256.493
54	Kewoti Lama	20	254.211
55	Nir Maya Lama	25	211.863
56	Manju Thapa	26	354.283
57	Bimla Kafle	28	220.297
58	Rama Tirwa	21	145.840
59	Pushpa Lamsal	20	417.450
60	Aasmaya Tamang	21	225.816
61	Sushma Dahal	23	112.638
62	Nirmala Giri	22	448.943
63	Kamala Giri	25	251.916
64	Rani Nepal	22	20.725
65	Sunita Shrestha	25	248.523
66	Sita Lamsal	25	272.014
67	Salina Thapa	20	367.762
68	Chameli Giri	21	197.809
69	Sita Kunwar	20	178.267
70	Man Kumari Chuwan	26	384.382
71	ChiniMaya Tamang	25	442.248
72	Sita Maya Shrestha	20	30.830
73	Anu Tamang	22	155.887
74	Reena Tamang	25	203.164
75	Nirmala Dangal	22	240.386
76	Shreejana Tamang	30	331.928
77	Maiya Puri	24	561.492
78	Rojena Ghatani	24	117.657
79	Sabita Pariyar	17	449.431
80	Sita Shrestha	24	89.314
81	Sun Maya Lama	24	100.276
82	Ranju Magrati	26	323.057
83	Binda Dhital	23	234.416
84	Shreejana B.K.	29	123.932
85	Radhika Sapkota	19	228.446
86	SunMaya Tamang	25	41.742
87	Anju Basnet	21	443.543
88	Dil Kumari Tamang	16	90.459
89	Ambika Acharya	22	264.368
90	Sita Shrestha	23	155.744
91	Indira Ghale	29	249.423

92	Dewaki Sharma	25	255.133
93	Pratikshya K.C.	22	422.260
94	Sushila Oli	20	64.390
95	Sangita Shrestha	29	116.706
96	Sunita Shrestha	20	439.435
97	Pramila Shrestha	23	133.755
98	Laxmi Tamang	20	386.456