# Beyond knowledge: The role of digital health literacy and food environment in Iron Deficiency Anemia management among Bangladeshi university communities- A Structural Equation Modeling approach

**SECTION A: Demographics & Health Profile**

Gender

1. Male
2. Female
3. Other

Current role at the university

1. Undergraduate student
2. Postgraduate/Masters student
3. PhD student / Doctoral researcher
4. Academic staff (lecturer/professor)
5. Administrative/support staff

Age

…… years

Height

……. (ft)

…… (in)

Weight

…….. (kg)

Academic discipline / department?

1. Health, Medicine, or Pharmacy
2. Science or Engineering
3. Business or Economics
4. Arts, Humanities, or Social Sciences
5. Law or Education
6. Other

Current residential status?

1. On-campus hall/hostel resident
2. Off-campus rental (mess/shared accommodation)
3. Living with family
4. Other

Approximate monthly household income (BDT)?

1. Below BDT15,000
2. BDT 15,001 – 30,000
3. BDT 30,001 – BDT 50,000
4. BDT 50,001 – BDT 80,000
5. Above BDT 80,000
6. Prefer not to say

Have you ever been diagnosed with iron deficiency anemia (IDA) or Anemia by a healthcare provider?

1. Yes
2. No
3. Not sure / Never tested

Do you currently take iron supplements or any iron-containing multivitamin?

1. Yes, prescribed by a doctor
2. Yes, self-initiated (over the counter)
3. No
4. Previously took but stopped

Do you have any chronic digestive issues (e.g., ulcers, frequent acidity)?

1. Yes
2. No

**SECTION B: Iron Deficiency Anemia (IDA) Knowledge**

**Score 1 for correct, 0 for incorrect.**

What does 'iron deficiency anemia' primarily refer to?

1. Lack of red blood cells due to insufficient iron
2. Excess iron stored in the liver
3. Infection of the blood caused by iron deficiency
4. Low white blood cell count

Which of the following is a primary symptom of Iron Deficiency Anemia?

1. Excessive thirst
2. Fatigue and weakness
3. Joint pain
4. Skin rash

Which food group is the richest source of dietary iron?

1. White Rice
2. Red Meat and Leafy Green Vegetables

3. Sugary drinks
4. Potatoes

Which habit reduces iron absorption in the body?

1. Drinking tea/coffee immediately after meals
2. Drinking water after meals
3. Eating fruit after meals
4. Walking after meals

Who is at the highest risk for Iron Deficiency Anemia?

1. Adult Men
2. Women of reproductive age and adolescents
3. Elderly men only

Can Iron Deficiency Anemia affect academic/work performance?

1. Yes
2. No
3. Not Sure

**D**o MALE university students and staff need to be concerned about IDA?

1. Yes, males can also develop IDA
2. No, IDA is primarily a female health issue
3. Only males with specific health conditions
4. I do not know

**SECTION C: Health Belief Model (HBM) Constructs**

**Perceived Susceptibility**

**5-Point Likert Scale: 1 (Strongly Disagree) to 5 (Strongly Agree).**

I think I am currently at risk of having anemia.

My daily dietary habits put me at risk of having low iron levels.

Given my lifestyle (food choices, tea intake, meal skipping), I could develop IDA without realising it.

**Perceived Severity**

**5-Point Likert Scale: 1 (Strongly Disagree) to 5 (Strongly Agree).**

Iron deficiency anemia is a serious health condition that requires attention.

IDA can significantly reduce my academic performance or work productivity.

If left untreated, IDA can lead to long-term health complications.

IDA-related fatigue is a real and disabling symptom, not just normal tiredness.

**Perceived Benefits**

**5-Point Likert Scale: 1 (Strongly Disagree) to 5 (Strongly Agree).**

Eating iron-rich foods regularly would improve my energy levels and concentration.

Avoiding tea/coffee immediately after meals would meaningfully improve my iron absorption.

Taking action now can prevent future health problems.

**Perceived Barriers**

**5-Point Likert Scale: 1 (Strongly Disagree) to 5 (Strongly Agree).**

Iron-rich foods (meat, fish, liver) are too expensive for my budget.

I am too busy with studies or work to pay attention to what I eat.

I find the taste of iron-rich foods (e.g., liver, certain greens) unpleasant.

I am not sure which foods or supplements are appropriate for improving iron levels.

I do not have easy access to iron-rich foods near my campus/ hostel/ house.

**Self-Efficacy**

**5-Point Likert Scale: 1 (Strongly Disagree) to 5 (Strongly Agree).**

I am confident I can change my diet to include more iron.

I can resist drinking tea/coffee right after my meals.

Even when eating at the university canteen, I can make iron-friendly food choices.

I can afford to buy nutritious food regularly.

**SECTION D: Digital Health Literacy (eHEALS)**

**5-Point Likert: 1 (Strongly Disagree) to 5 (Strongly Agree).**

I know how to find helpful health resources on the Internet.

I know how to use the Internet to answer my health questions.

I know what health resources are available on the Internet.

I know where to find helpful health resources on the Internet.

I know how to use the health information I find on the Internet to help me.

I have the skills I need to evaluate the health resources I find on the Internet.

I can tell high quality from low quality health resources on the Internet.

I feel confident in using information from the Internet to make health decisions.

**SECTION E: University Food Environment**

**Part 1: Physical access to iron-rich foods**

**5-Point Likert: 1 (Strongly Disagree) to 5 (Strongly Agree).**

Iron-rich foods (meat, fish, eggs, green leafy vegetables, lentils) are readily available at my university canteen or cafeteria.

There are food outlets or markets near my campus where I can purchase iron-rich foods easily.

Fresh fruits and vegetables (which aid iron absorption) are easily accessible near my campus.

**Part 2: Economic access and affordability**

**5-Point Likert: 1 (Strongly Disagree) to 5 (Strongly Agree).**

Iron-rich foods available near my campus are affordable within my daily budget.

The cheapest meals available near my campus are adequate in iron content.

I often compromise on food quality, including nutritional content, because of cost constraints.

**Part 3: Institutional food quality and information environment**

**5-Point Likert: 1 (Strongly Disagree) to 5 (Strongly Agree).**

My university canteen provides nutritionally balanced meals that include sources of iron.

Nutrition information (iron content, food labels) is available at my university's food outlets.

My university has organised health or nutrition awareness programmes related to anemia.

There is a campus health clinic or nutritionist I could consult about my iron levels.

**Part 4: Cultural and social food environment**

**5-Point Likert: 1 (Strongly Disagree) to 5 (Strongly Agree).**

Cultural or religious norms in my community restrict my consumption of certain iron-rich foods.

Peer eating habits in my social circle strongly influence what I eat on campus.

It is socially acceptable in my environment for males to eat iron-rich foods specifically for health reasons.

There are food taboos in my family or community that prevent me from eating certain nutritious foods.

**SECTION F: Dietary Practices, Symptoms & Productivity**

**1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Daily**

How often do you consume red meat (beef/mutton)?

How often do you consume liver (beef/chicken)?

How often do you consume fish?

How often do you consume green leafy vegetables (e.g., Spinach/Palong, Red Amaranth/Lal shak, Taro Leaves/ Kochu shak)?

How often do you consume lentils or beans (Dal)?

How often do you drink tea or coffee *immediately* after a meal?

Do you take iron or multivitamin supplements?

1. Yes
2. No

**SECTION G: Symptoms & Productivity**

**H1: Self-Reported Anemia Symptoms (Frequency in last 4 weeks or 28 days)**

**1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always**

Feeling unusually tired or fatigued.

Difficulty concentrating on studies/work.

Pale skin or inner eyelids.

Dizziness when standing up quickly.

Shortness of breath during mild exercise.

**H2: Work/Academic Performance (Adapted from WHO HPQ)**

**Absenteeism**

In the past 4 weeks (28 days), how many ENTIRE days did you miss your studies or work due to physical health problems such as fatigue, weakness, or dizziness?

Number of days (0-28): ……

In the past 4 weeks (28 days), how many days did you attend studies or work but were unable to perform at your usual capacity due to physical health problems?

Number of days (0-28): ……

**Presenteeism**

Your overall academic or work performance over the past 4 weeks.

**0 is (Bottom Performance) and 10 is (Top Performer)**

Your ability to concentrate and focus during the past 4 weeks.

**0 (Completely Unable) to 10 (Performing at Full Capacity)**

**Impact**

To what extent do you feel your health (fatigue/energy levels) limits your productivity?

1. Not at all
2. Slightly
3. Moderately
4. Very Much
5. Extremely