Prioritizing Areas for Implementation of Biofortified Rice in Bangladesh

Nutr 231: Fundamentals of GIS
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HarvestPlus has developed a biofortified, high-yield variety of rice in the two primary planting seasons (Aman and Boro). These varieties are contained in this outlined box along the bottom.

1. Determining the conditions conducive to implementing HZR was based on production and consumption patterns and the probability of adopting a high yield variety of rice in the two primary planting seasons (Aman and Boro). These factors were ranked based on factors that determined the likelihood of adopting a high yield variety of rice in Aman and Boro seasons.
2. Total annual rice production as well as the proportion retained for home consumption was calculated at the household level.
3. Households were ranked based on factors that determined the likelihood of adopting a high yield variety of rice in Aman and Boro seasons.
4. Under 5 mortality rates by subdistrict were mapped by subdistrict.
5. The prevalences of acute respiratory infections (ARI) (used as a proxy for pneumonia), diarrhea and stunting were calculated and mapped at the level of the survey cluster.
6. These variables were averaged across subdistricts and scored ranging from low to high. Low score was given to low production, low proportion retained, low likelihood of adoption, and low consumption. High score was given to high production, high proportion retained, high likelihood of adoption, and high consumption. The scores for these layers were combined to produce the "Favorable Production and Consumption Conditions" map.
7. Determining areas with poor overall health status related to zinc deficiency was done by combining health statistics related to zinc deficiency. These layers are contained in the blue outlined box along the right.
8. The prevalences of acute respiratory infections (ARI) (used as a proxy for pneumonia), diarrhea and stunting were calculated and mapped at the level of the survey cluster.
9. These variables were averaged across subdistricts and scored ranging from low to high. Low score was given to low production, low proportion retained, low likelihood of adoption, and low consumption. High score was given to high production, high proportion retained, high likelihood of adoption, and high consumption. The scores for these layers were combined to produce the "Favorable Production and Consumption Conditions" map.
10. Determining the conditions conducive to implementing HZR was based on production and consumption patterns and the probability of adopting a high yield variety of rice in the two primary planting seasons (Aman and Boro). These factors were ranked based on factors that determined the likelihood of adopting a high yield variety of rice in Aman and Boro seasons.
11. Total annual rice production as well as the proportion retained for home consumption was calculated at the household level.
12. Households were ranked based on factors that determined the likelihood of adopting a high yield variety of rice in Aman and Boro seasons.
13. Under 5 mortality rates by subdistrict were mapped by subdistrict.
14. The prevalences of acute respiratory infections (ARI) (used as a proxy for pneumonia), diarrhea and stunting were calculated and mapped at the level of the survey cluster.
15. These variables were averaged across subdistricts and scored ranging from low to high. Low score was given to low production, low proportion retained, low likelihood of adoption, and low consumption. High score was given to high production, high proportion retained, high likelihood of adoption, and high consumption. The scores for these layers were combined to produce the "Favorable Production and Consumption Conditions" map.
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20. Total annual rice production as well as the proportion retained for home consumption was calculated at the household level.
21. Households were ranked based on factors that determined the likelihood of adopting a high yield variety of rice in Aman and Boro seasons.
22. Under 5 mortality rates by subdistrict were mapped by subdistrict.
23. The prevalences of acute respiratory infections (ARI) (used as a proxy for pneumonia), diarrhea and stunting were calculated and mapped at the level of the survey cluster.
24. These variables were averaged across subdistricts and scored ranging from low to high. Low score was given to low production, low proportion retained, low likelihood of adoption, and low consumption. High score was given to high production, high proportion retained, high likelihood of adoption, and high consumption. The scores for these layers were combined to produce the "Favorable Production and Consumption Conditions" map.

Introduction
In developing countries micronutrient deficiencies remain one of the major causes of death and loss of healthy, productive lives. To combat these deficiencies, HarvestPlus is developing biofortified crops with greater micronutrient levels capable of increasing daily adequacy. HarvestPlus has developed a biofortified, high-zinc rice (HZR) for Bangladesh, a country which has high deficiencies of zinc and iron. The purpose of this analysis is to prioritize areas for implementation of HZR in Bangladesh.

Methodology
The prioritization of areas for implementation of HZR was based on two primary factors: 1) production and consumption conditions conducive to implementing HZR, and 2) prior overall health status related to zinc deficiency.

1. Determining the conditions conducive to implementing HZR was based on production and consumption patterns and the probability of adopting a high yield variety of rice in the two primary planting seasons (Aman and Boro). These layers are contained in this outlined box along the bottom.
2. Total annual rice production as well as the proportion retained for home consumption was calculated at the household level.
3. Households were ranked based on factors that determined the likelihood of adopting a high yield variety of rice in Aman and Boro seasons.
4. Total daily rice consumption was calculated for individuals.
5. These variables were averaged across subdistricts and scored ranging from low to high. Low score was given to low production, low proportion retained, low likelihood of adoption, and low consumption. High score was given to high production, high proportion retained, high likelihood of adoption, and high consumption. The scores for these layers were combined to produce the "Favorable Production and Consumption Conditions" map.
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Conclusion
Subdistricts within the divisions of Barisal and Chittagong in the southeast of Bangladesh should be prioritized first for implementation, followed by those within Rajshahi and Rangpur divisions in the northwest and Sylhet in the northeast.

A few limitations should be noted. First, only subdistricts for which information on each variable was available were used in this analysis. This resulted in data for 331 of 463 subdistricts. Second, rice is consumed throughout all of Bangladesh. Households primarily either produce it themselves or buy it. Households that produce a lot sell a lot. Therefore, different approaches can be taken for determining favorable production/consumption conditions and may yield different results.

Results and Discussion
The prioritization of areas for implementing HZR in Bangladesh is sold to Barisal and Chittagong vs. subdistricts within neighboring divisions Khulna and Dhaka where health outcomes related to zinc deficiency are not as poor. This resulted in data for 331 of 463 subdistricts. Second, rice is consumed throughout all of Bangladesh. Households primarily either produce it themselves or buy it. Households that produce a lot sell a lot. Therefore, different approaches can be taken for determining favorable production/consumption conditions and may yield different results.

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