Impact of a health education program to promote consumption of vitamin A rich foods in Bangladesh

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SUMMARY
In order to promote production and consumption of locally available β-carotene rich foods in the form of dark green leafy vegetables, a health education program was launched in the northern part of Bangladesh. The objective of the present study was to evaluate the effectiveness of the education campaign to deliver the message to the target audience, and to promote consumption of vitamin A rich foods among the general population of the study area. Different media and communication channels, both traditional and modern, were employed to communicate the message of locally available vitamin A rich foods and its importance for sight. The educational approaches were developed in the communities of intervention with active contribution of its members. Community participation was secured at all stages. The approaches were monitored and modified according to the suggestions of the locally organized working team. In previous papers we have shown that the program succeeded in improving local inhabitants’ knowledge as well as food practices during intervention. The results showed that entertainment education programs appeared to deliver the message to a wider audience than other forms of communication. However, interpersonal communication was found to be a crucial factor for the promotion of vitamin A rich foods in this population. Mothers’ literacy and socioeconomic status were important factors for the comprehension of the message and consumption of vitamin A rich foods.

Key words: Bangladesh; health education; vitamin A

INTRODUCTION
It has been estimated that one million children aged between 6 months and 6 years have clinical signs of vitamin A deficiency in Bangladesh. Almost 100 children go blind every day, and more than half of these children with blindness die within a few weeks (Mustaque et al., 1989).

Unlike very many parts of the world with high prevalence of xerophthalmia/night blindness, in Bangladesh there is abundance of carotene-rich foodstuffs in the form of green leafy vegetables and yellow fruits. High consumption of these food items has been shown to be associated with a reduction in nutritional blindness in Bangladesh (Hussain et al., 1993; Hussain and Kvåle, 1996), in Indonesia (Tarwotjo et al., 1982), and in Sudan (Fawzi et al., 1993). The question remains as to why so many children continue to suffer from vitamin A deficiency in areas with an abundance of relatively inexpensive food items rich in β-carotene. The use of green leafy vegetables is generally associated with low social status. This may contribute to lower consumption, especially among children (Drexler, 1988). Moreover, local cooking procedures destroy a large fraction of the β-carotene in the vegetables (Drexler, 1988).

The challenge is to find simple approaches which are acceptable to the community and viable within their economic reach, in order to change their food consumption as a means to reduce the morbidity of nutritional blindness. Several studies have indicated that long-term
prevention of night blindness should rely on increased consumption of locally produced vitamin A rich foods. To our knowledge, however, interventions solely based on health education and community participation are scarce. The purpose of this article is to examine the usefulness of various community-oriented health education approaches in delivering the message in order to promote higher consumption of locally available β-carotene rich foods to the target population. Further, associations between reported exposure to the message through specific channels and reported food consumption were assessed.

MATERIALS AND METHODS

The areas of intervention were selected from a district in the northern part of Bangladesh, demarcated as a high-risk area according to the national xerophthalmia study of 1982–1983 (Cohen et al., 1985). The intervention took place during the period 1986–1989. Seven upazilas (sub-districts) from Ranjpur district, with a total of 482,673 households and a population of 2,781,685 in 1986, were included in the intervention program. Following a multi-stage random sampling procedure, the evaluation survey of 1989 included 2,011 households with a total population of 10,456. Information was collected by interview with the use of a structured questionnaire 6–9 weeks after the last delivery of the campaign message. Details of the procedure have been described in an earlier paper (Hussain et al., 1993). Respondents were asked whether they knew about the causes of and the preventive measures against the occurrence of night blindness. If the answer of the respondent was ‘yes’, they were then asked to describe their knowledge verbally. Those, who knew about the causes of night blindness were requested to provide the sources of information of their knowledge. Respondents were allowed to state more than one source of information, and the answers were registered separately for the husbands and the wives following a structured questionnaire. During the interview, there were 21 households with only the father, 981 households with only the mother and 1009 households with both the father and mother. The term ‘exposure to intervention’ used in this paper will denote respondents’ answers to questions regarding the channel(s) from which they stated they received the information on the causes of and preventive measures against night blindness.

Planning and execution of the educational program

Prior to initiation of the program, representatives from the local health authority, government administration, non-governmental organizations (NGOs) and local leaders were invited to a 2-day seminar in order to plan the organizational and intervention procedures and to secure cooperation through participation from all segments of the population in the intervention communities. A working team was organized in each upazila (sub-district) with the upazila chairman as head of the team. The working teams were responsible for community meetings once a month with people from the local communities and the project administration for the respective areas. The messages were delivered on three different levels in the intervention areas, i.e., individuals, groups and communities. The working teams were also responsible for monitoring and advising the program administration on modifications for the intervention strategy.

Interventional channels

Thirteen different media approaches and communication channels, both traditional and modern, were employed for nutrition education in the intervention communities. Among the main media approaches, there were the following.

Folk singers

Traditional musical culture that has lasted in these localities for centuries was used with modified text (texts were converted to incorporate the message about nutritional blindness), maintaining the original rhymes and tunes and using traditional musical instruments. This message was displayed in the local market places and in the villages with a group of households every month.

Women volunteers

Women volunteers were recruited locally and given training about participatory communication in order to convey the message of nutritional blindness, including signs/symptoms and its prevention with proper dietary habits. These volunteers visited every individual household once a month and arranged group meetings for the mothers (ten households per group) every
fortnight. The women volunteers were equipped with flip-charts for demonstrations.

**Village projector**

Short films made by the popular film artists of Bangladesh were shown in the villages. The causes and prevention of nutritional blindness were conveyed with short stories in a humorous way. Films were shown monthly in every village.

In addition, there were the following group activities:

- Neighbourhood groups were organized voluntarily to disseminate information about nutritional blindness through discussions. These groups acted as a supporting council for the ‘working team’.
- ‘Mother groups’ were organized to meet weekly/fortnightly to discuss issues related to nutritional blindness, nutritional diet especially for children, pregnant and lactating mothers, and to raise questions regarding food and nutrition with the local women volunteers.

Other communication channels used were: school sessions, programs on local radio and television, cinema slide shows, newspaper spots, posters, local leaders and health workers; and homeyard gardening activity was introduced as another way of conveying the message of nutritional blindness and to promote production and consumption of locally available vegetables rich in β-carotene.

For the analyses of data, the communication channels were grouped as follows:

- **Channel 1**—communicating to individuals and groups through direct contacts (women volunteers, project workers, health workers, rural leaders).
- **Channel 2**—one-way communication to audiences in community settings (schools, folk singers, village movie projector shows, cinema slides, training at villages).

**Mass media: radio, television and posters**

Data on socioeconomic status, mother’s literacy, family size and food consumption practice were collected by interview. Food consumption data were collected by interview for the last 3 days prior to the interview. The information was collected at family level for 1721 households.

**Statistical procedure**

Statistical comparisons between different groups were made using the $\chi^2$ test for contingency tables. All $p$-values presented are two-tailed. The Statistical Package for the Social Sciences (v. 4.0) was used for the statistical analyses (SPSS/PC, 1990).

![Bar chart showing percentages of respondents who answered yes to the question about knowledge relating to night blindness and could explain verbally.](image)

This figure represents the percentage of those who said yes to the question about knowledge relating to night blindness and could explain verbally.

Educational approaches:

- **FS** = Folk singers
- **WV** = Women volunteers
- **VP** = Village movie projector
- **Post** = Poster
- **PW** = Project workers
- **Rad** = Radio
- **Neig** = Neighbours
- **TV** = Television
- **SKL** = Schools
- **CS** = Cinema slides
- **HW** = Health workers
- **RL** = Rural Leaders

**Fig. 1:** Sources of information about the causes and the preventive measures of night blindness (as reported by the parents), Ranipure, Bangladesh, 1989.
RESULTS

Different communication channels had different rates of success in communicating the message to the target population (Figure 1). Among the different intervention approaches, the use of folk singers, women volunteers and village film projectors showed the greatest success in delivering the message to the target population.

Exposure to the mass media was significantly lower among the households with illiterate mothers, households earning less than Tk1501 (US $35) a month and households possessing less than 25 decimal of agricultural land (Table 1). However, communicating the message to the target population through direct personal contact (Channel 1) and audiences in community settings (Channel 2) was not notably affected by the variables mentioned above.

Table 2 shows that campaign exposure is associated with consumption of dark green leafy vegetables, the odds ratio being significant for Channel 1 and of borderline significant for Channel 2 and the mass media. Consumption of protein items (≥3 times) was significantly associated with exposure to the message through the mass media.

DISCUSSION

The most effective channels of communication seemed to be those that targeted individuals and groups in a traditional fashion, indicating the need to strengthen the interpersonal and conventional communicative approaches (Figure 1). However, analyses based on correlations showed that entertainment approaches, such as those using folk singers and village movie projectors (Channel 2), had weaker association with higher consumption of dark green leafy vegetables when compared to the approach employing women volunteers (data not shown).

Different media channels varied to a certain extent in terms of the number of occasions on which the message was delivered. Folk singers,

<p>| Table 1: Proportion of respondents reporting exposure to different media channels by socioeconomic and demographic variables, Ranjpure, Bangladesh, 1989 |
|-----------------------------------------------|------------------|------------------|------------------|
| Total number | Proportion (%) exposed to: |</p>
<table>
<thead>
<tr>
<th></th>
<th>Channel 1&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Channel 2&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Mass media&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2011</td>
<td>85.0</td>
<td>86.4</td>
</tr>
<tr>
<td>Mother’s literacy&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>1498</td>
<td>84.9</td>
<td>86.1</td>
</tr>
<tr>
<td>Literate</td>
<td>508</td>
<td>86.0</td>
<td>88.0</td>
</tr>
<tr>
<td>p-value for difference</td>
<td>0.6</td>
<td>0.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Household income&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–1500 Tk</td>
<td>1225</td>
<td>84.4</td>
<td>85.1</td>
</tr>
<tr>
<td>≥1500 Tk</td>
<td>781</td>
<td>86.4</td>
<td>88.9</td>
</tr>
<tr>
<td>p-value for difference</td>
<td>0.2</td>
<td>0.02</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Family size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–4members</td>
<td>860</td>
<td>84.4</td>
<td>84.9</td>
</tr>
<tr>
<td>≥5 members</td>
<td>1151</td>
<td>85.4</td>
<td>87.5</td>
</tr>
<tr>
<td>p-value for difference</td>
<td>0.6</td>
<td>0.1</td>
<td>0.4</td>
</tr>
<tr>
<td>Homestead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>359</td>
<td>84.7</td>
<td>86.9</td>
</tr>
<tr>
<td>Yes</td>
<td>1647</td>
<td>85.3</td>
<td>86.8</td>
</tr>
<tr>
<td>p-value for difference</td>
<td>0.8</td>
<td>1.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Land owning&lt;sup&gt;4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤25 decimal</td>
<td>1121</td>
<td>84.8</td>
<td>85.1</td>
</tr>
<tr>
<td>&gt;25 decimal</td>
<td>890</td>
<td>85.2</td>
<td>88.0</td>
</tr>
<tr>
<td>p-value for difference</td>
<td>0.9</td>
<td>0.07</td>
<td>0.04</td>
</tr>
</tbody>
</table>

<sup>a</sup>Communicating to individuals and groups through direct contacts (women volunteers, project workers, health workers, rural leaders and neighbours).

<sup>b</sup>One-way communication to audiences (schools, folk singers, short films cinema slides and training at villages).

<sup>c</sup>Mass-media communication (radio, television and posters).

<sup>d</sup>Missing values for mother’s literacy, household income or possession of a homestead for five observations.
Table 2: Odds ratios (OR) and 95% confidence intervals (CI) for high consumption of different food items according to reported exposure to the message through different media approaches, Ranjpure, Bangladesh, 1989

<table>
<thead>
<tr>
<th>Communication</th>
<th>DGLV&lt;sup&gt;a&lt;/sup&gt;</th>
<th>OR&lt;sup&gt;c&lt;/sup&gt;</th>
<th>OR&lt;sup&gt;d&lt;/sup&gt;</th>
<th>95% CI</th>
<th>Protein items&lt;sup&gt;b&lt;/sup&gt;</th>
<th>OR&lt;sup&gt;c&lt;/sup&gt;</th>
<th>OR&lt;sup&gt;d&lt;/sup&gt;</th>
<th>95% CI</th>
<th>Yellow fruits</th>
<th>OR&lt;sup&gt;c&lt;/sup&gt;</th>
<th>OR&lt;sup&gt;d&lt;/sup&gt;</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;3 times</td>
<td>≥3 times</td>
<td>&lt;3 times</td>
<td>≥3 times</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel 1 (N)&lt;sup&gt;e&lt;/sup&gt;</td>
<td>127</td>
<td>90</td>
<td>133</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel 1 (Y)&lt;sup&gt;e&lt;/sup&gt;</td>
<td>628</td>
<td>876</td>
<td>855</td>
<td>648</td>
<td>1.2</td>
<td>1.1</td>
<td>0.8–1.5</td>
<td></td>
<td>140</td>
<td>77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel 2 (N)&lt;sup&gt;f&lt;/sup&gt;</td>
<td>141</td>
<td>120</td>
<td>162</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel 2 (Y)&lt;sup&gt;f&lt;/sup&gt;</td>
<td>614</td>
<td>846</td>
<td>826</td>
<td>634</td>
<td>1.3</td>
<td>1.2</td>
<td>0.9–1.6</td>
<td></td>
<td>934</td>
<td>527</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Mass media (N)&lt;sup&gt;g&lt;/sup&gt;</td>
<td>403</td>
<td>441</td>
<td>535</td>
<td>314</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass media (Y)&lt;sup&gt;g&lt;/sup&gt;</td>
<td>352</td>
<td>525</td>
<td>453</td>
<td>419</td>
<td>1.6</td>
<td>1.4</td>
<td>1.1–1.7</td>
<td></td>
<td>549</td>
<td>324</td>
<td>1.1</td>
<td>1.0</td>
</tr>
</tbody>
</table>

<sup>a</sup>Dark green leafy vegetables.
<sup>b</sup>Fish, meat, milk or eggs.
<sup>c</sup>Crude estimate.
<sup>d</sup>Adjusted for household income, mother’s literacy and possession of a homestead.
<sup>e</sup>Communicating to individuals and groups through direct contacts (women volunteers, project workers, health workers, rural leaders and neighbours).
<sup>f</sup>One-way communication to audiences (schools, folk singers, short films, cinema slides and training at villages).
<sup>g</sup>Mass media (radio, television and posters).
women volunteers and village movie projector shows delivered the message monthly during the intervention period of 3 years. ‘Mother groups’ were organized fortnightly, where the local women volunteers were present. Mothers were assembled in order to encourage the exchange of views regarding food consumption and health issues. Primarily, this forum was not organized for message delivery. School sessions, radio, TV, cinema slide shows and posters appeared more frequently (at least once a week) than communication channels such as those employing health workers, rural leaders and training at villages. This variation happened largely due to the nature of the media, but the intervention continued over a period of 3 years. Therefore, all the channels should have delivered the message to the audience on a number of occasions, enough to mark its presence. Consequently, it is unlikely that this difference in numbers for the message delivery should have influenced ‘recall information’ significantly. Furthermore, in the real world, it is infeasible to secure perfectly equal delivery of all the channels employed in an intervention campaign over a reasonably long period of time.

Illiteracy among mothers and low household income seemed to represent barriers for receiving the message about proper food habits (Table 1). Literacy of the mothers may often represent a proxy indicator of the economic status of a household. Our earlier papers have also shown that the prevalence of night blindness varied according to the socioeconomic status of the households (Hussain et al., 1993, 1996). Furthermore, Aarø (1986) has also shown that health behaviour varies according to socioeconomic status, even in an affluent society such as Norway. It appears from the results that the message exposure varied according to socioeconomic status in this population. It has been suggested that variations in message delivery should be examined prior to assessing the effectiveness of interventions (Patton, 1979; Kolbe and Iverson, 1981; Windsor et al., 1984; Lipsey et al., 1985). Further, Scheirer et al. (1995) suggested that the variations in message delivery by socioeconomic conditions should be controlled for statistically. It is evident in our data that the delivery of the message through interpersonal communication (Channel 1) was not hindered by socioeconomic barriers.

The likelihood of consuming dark green leafy vegetables was higher among households who were exposed to interpersonal or group communication/education. Consumption of protein items was more common among those who were informed through the mass media (Table 2). This was the case even after adjustment for household income, mother’s literacy and possession of a homestead. Access to the mass media (radio, television and posters) may indicate higher socioeconomic status which, in turn, is associated with a higher consumption of the more expensive meat products.

Not only socioeconomic conditions influence food preferences, but also other factors such as class identity, religious identity, taste and belief of an expected (good health) outcome are likely to be important. Within social cognitive theory, outcome expectations provide the motivation for behaviour, while skills provide the capability to perform the behaviour and self-efficacy provides the confidence that barriers can be overcome (Baranowski, 1990). Therefore, it was attempted to raise expectations of a healthy child through locally available β-carotene rich foods. Proficiency (skill) was enhanced by empowering the community members with the necessary knowledge of the nutrient values of locally available foods and their cultivation.

Our results suggest that in the rural areas of Bangladesh, interpersonal communication plays an important role and therefore needs to be given priority in order to promote proper food consumption behaviour among economically impoverished households. Unlike in the western hemisphere, interpersonal communication approaches are inexpensive, but still effective for disseminating the message and probably also for stimulating community participation in the developing world. Entertainment approaches employing folk singers and short films (projectors) appear to disseminate the message to a larger population, but may not promote the necessary food practices accordingly. This may indicate that the audiences exposed to these media have been more attentive to the enjoyment rather than to act in response to the message.

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