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## **CONTRIBUTING VARIABLES FOR SUSTAINABLE LIVELIHOOD STATUS OF THE CHAR WOMEN IN BANGLADESH**

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**Abstract.** The main purpose of the study was to determine the contribution of variables to the sustainable livelihood status of char women. The sustainable livelihood status of a char woman was measured by computing a “sustainable livelihood status score” which is considering six major aspects of her livelihoods: food security, ability to provide family education, health and sanitation, shelter and family assets, clothing condition and social upliftment. Data were collected from 200 randomly selected char women by using interview schedule in two Upazilla of Jamalpur district in Bangladesh during November 2006 to March 2007. More than two-fifths (67.5 per cent) of the char women were found under “medium sustainable livelihood status” compared to more than one-fifth (20.5 per cent) of them belongs to ‘low sustainable livelihood status’ and only 12 per cent to “high sustainable livelihood status”. Pearson correlation test depicted that out of 16 variables, 13 had significant positive relationships with the sustainable livelihood status. Results of stepwise multiple regression analysis revealed that five variables namely, annual income, agricultural knowledge, income generating activities, family education and organizational participation contributed significantly which combinedly explained 76.3 per cent of total variation to the sustainable livelihood status. Path analysis indicated that these variables had both direct and indirect effects to the sustainable livelihood status. Women who had more annual income, better agricultural knowledge, participation in income generating activities, more family education and more organizational participation were found to better sustainable livelihood status in char area. Government or concern other authorities need to give attention to these variables for any sustainable livelihood upliftment programme.

**Key words:** sustainable, livelihood status, contributing variables, char, women

## INTRODUCTION

Sustainable livelihoods are derived from people's capacity to make a living by surviving shocks and stress and improve their material condition without jeopardizing the livelihood options of other people's, either now or in the future. This requires reliance on both capabilities and assets for a means of living. One of the ways to understand sustainable livelihoods systems is to analyse the coping and adaptive strategies pursued by individuals and communities as a response to external shocks and stress such as drought, civil strife and policy failures [Saleth and Swaminathan 1993]. The major livelihood assets are the human, natural, financial, physical and social capitals. No single category of assets on its own is sufficient to yield many and varied livelihoods outcome that people seek. The main factors that affect livelihood status are the vulnerability due to shocks (e.g. cyclone), trends (e.g. population), seasonality (e.g. change in weather), and transformation of structure (e.g. Government Organization/Non Government Organization), and process (e.g. Laws and policies). Depending on the vulnerability context and the transforming structures and process, the people undertake the range and combination of activities and choice (including productive activities, investment strategies, reproductive choice etc.) in order to achieve their livelihood outcome [Sam-suzzaman and Haque 2002]. The fundamental requirement for the improvement of livelihoods of the household is to enhance people's strength and activities essential for the means of living. The livelihood approach is founded on a belief that people require a range of assets to achieve a positive livelihood outcome.

Bangladesh is considered as a developing country where 48.6 per cent population is female and 51.4 per cent population is male [Women in agriculture... 2003]. Women are playing pivotal roles to make their livelihoods sustainable in Bangladesh. They are working for providing not only family's own consumption but also their other requirements. Women's role as the principle labour force has the prime importance for the poor household resources to survive. Rural women of Bangladesh are employed in a broad range of agricultural activities such as post harvest operation, kitchen gardening, caring animals, raising poultry, rice husking etc [Jaim and Rahman 1988]. Women supplement family income by undertaking different income generating activities [Rahman 1996]. They earn money by working in different small-scale industries such as cottage industry, food-processing industry, tobacco industry etc. They are involved in different income generating activities like sewing dress, making baskets, papers, flower bases, rearing of poultry, livestock, bee, mushroom production etc. They are also involved in different small-scale businesses like selling fertilizers, and seed and packaging products. Women in some areas are also involved in processing of jute for the market [Abdullah and Zeidenstein 1982]. In Bangladesh about 600 000 people live in char area which is 6 to 7 per cent of total population [Sarker et al. 2003]. These areas are highly vulnerable to sudden and forceful flooding, as well as erosion and loss of land, which makes living in the chars both hazardous and insecure. Char women are performing a huge number of activities for maintaining their livelihoods sustainable.

**Char:** Char is a tract of land surrounded by waters of an ocean, sea, lake or stream or pieces of land resulting from the accretion of silt in river channels. Chars are the areas of new lands formed through the continual process of erosion and deposition in the major rivers and coastal areas of Bangladesh. In Bangladesh, there are two different

types of chars; islands chars and attached chars. Island chars, which are surrounded by water year round and can be reached from the main land by crossing a main channel. Attached chars, which are connected to the mainland and accessible without crossing a main channel during the dry season, yet are inundated or surrounded by water during the peak of a normal flood (normal monsoon). The islands chars are found to be flooded more extensively than attached chars.

**Char women:** Women who live in char areas are called char women.

Like in the main land of Bangladesh, rice is the main crop which is cultivated in three seasons. Besides the rice cultivation pulse, wheat, ground nut, chilli, maize, vegetables etc are also cultivated by char people. The traditional gender relation with women's involvement in post harvest work and men's in fieldwork has not remained static over time. Presently due to extreme poverty and food crisis, social norms and tradition are changing and also women are appearing in the field [Shirin 1995]. Women are intimately involved in all phases of agricultural activities in char area. Women adopt diverse and intense household resource strategies to cope with food deficit situation. They play an important reproductive role and are responsible for maintaining hygienic support for household members. Char women play significant roles in increasing financial capital of household directly or indirectly. The daily life of char women is characterized by the search for water, fuel and inputs for either agriculture or household production, including food security. Char people basically survive on agriculture and agriculture related activities for their livelihoods. But in all spheres of their livelihoods, they face difficulties like lack of improved technology, less capital, poor marketing system etc. Due to flood, every year char people have to migrate from their shelters and as a result they suffer huge amount of economic losses in agricultural and non-agricultural sectors. This hampered them to survive in a structured living. In such difficult conditions in char areas, both males and females play important roles to make their livelihoods sustainable. Keeping this view in mind, the present study was undertaken with the objectives to identify the contributing variables which maintain the sustainable livelihood status of char women in Bangladesh.

## **MATERIALS AND METHODS**

### **Locale of the study**

The study was conducted in selected char areas under Jamalpur district of Bangladesh. Most of the upazilas (administrative unit) under Jamalpur district consist of char areas and the Jamuna and the Brahmaputra rivers passing away through this district. Among the seven upazilas (Jamalpur proper, Sarishabari, Madarganj, Melandaha, Islampur, Dewanganj, Bakhshiganj) of Jamalpur district two upazilas, namely Islampur and Dewanganj, were selected randomly for the study. From each of the two upazilas, one union namely Belgacha of Islampur upazila and Chukaibari union of Dewanganj upazila were purposively selected for the study. Because these two unions fully consider as char area relatively than others. Village Munnar char and Ghunapara from Belgacha union of Islampur upazila, village Halkerchar and Balugram from Chukaibari union of

Dewanganj upazila were randomly selected. The geographical location of Islampur upazila is at 25°00' to 25°10' north latitude and 89°40' to 89°52' east longitude and the geographical location of Dewanganj upazila is at 25°10' to 25°26' north latitude and 89°40' to 89°48' east longitude. A map of Jamalpur district with the study area in Islampur and Dewanganj upazilas has been presented in Figure 1.

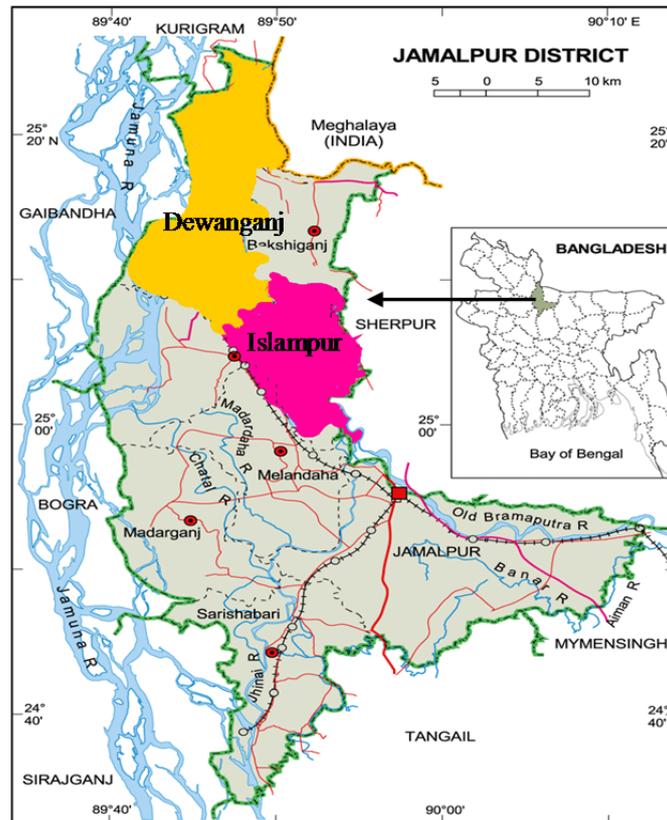


Fig. 1. Map of Jamalpur district showing Islampur and Dewanganj Upazilla

Rys. 1. Mapa dystryktu Jamalpur, ukazująca poddystrykty Islampur i Dewanganj

### Data collection and statistical analysis

Data were collected through a personal interview by using a structured interview from November 2006 to March 2007. Necessary secondary data were also collected from different sources in addition to primary data. Descriptive statistical measures such as numbers, percentage distribution, range, mean, standard deviation and coefficient of variation were used in describing the selected variables. To examine the relationship between the independent and dependent variables, Pearson's Product Moment correla-

tion Coefficient (r) was done. To ascertain the per cent contribution of an independent variable on the dependent variable full model and stepwise regression analyses were used. Path analysis technique was also used to interpret the cause effect relationship.

### **Measurement of independent variable**

The independent variables such as age, education, family education, family size and farm size were measured by using the measuring units of year, year of schooling, number of members and hectare respectively. The annual income was measured on the basis of total annual earning by all the members of the family and expressed in Taka. In order to know the level of knowledge of a respondent for each of the six technical aspects as variety and its attributes; time of transplanting and spacing; fertilizer management; weeding and irrigation; plant protection measures; environment and ecology. A total number of 36 ( $6 \times 6 = 36$ ) questions for the above mentioned six technical aspects with six level of cognitive behaviour were furnished in the questionnaire to represent the knowledge on vegetable cultivation. The total credit for the 36 questions was 60. Full score was given to a respondent for correct answer and zero for wrong answer. For partially correct answer proportionate/partial score was given on the basis of the degree of answers correctness. In calculating the social participation score two dimensions namely, extent of participation and nature of participation in social activities, were considered. Scoring for extent of participation was '0' for not at all participation, '1' for low participation, '2' for moderate participation and '3' for regular participation. The scoring for nature of participation was '1' for indirect participation and '2' for direct participation. The social participation score was computed for each of the social activities by multiplying the score obtained from the extent of participation with its corresponding scores from nature of participation. The scores for all the items were added together to have the total score of social participation of a char woman. Organizational participation, innovativeness, cosmopolitaness and extension media contact were measured as usual methods which are which exist in social sciences.

### **Measurement of dependent variable (sustainable livelihood status)**

The dependent variable "sustainable livelihood status" of a char woman refers to the position of her household's living conditions on the basis of her socio-economic status in char areas. Sustainable livelihood status of a char woman was measured in this study by computing a livelihood status score by considering six major aspects or dimensions of her livelihoods: food security, ability to provide family education, health and sanitation, shelter and family status, clothing condition and social upliftment. For each of these aspects sub-score was computed following some procedures. The summation of the sub-scores of all the six aspects/dimensions yielded the sustainable livelihood status score. The measuring procedure of the sub-scores and sustainable livelihood status score of a char woman is summarized below:

#### **1. Computation of food security sub-score**

Food security of a char woman was measured by computing a "food security sub-score". Food security sub-score was measured on the basis of availability of necessary food throughout the year in her family. The information had been collected for twelve months. Scoring for availability of food was '3' for adequate food availability, '2' for

inadequate food availability and '1' for scarce food availability. The scores thus obtained from each respondent were added together to yield overall food security sub-score of a char woman. Thus, food security sub-score varied from 12 to 36 while, 12 indicated lowest and 36 indicated highest level of food security.

### **2. Computation of ability to provide family education sub-score**

Ability to ensure family education of a char woman was measured by computing an "ability to provide family education sub-score". A total item of ability to provide family education is meant at four levels, namely: primary educations, secondary, higher secondary and university level education were under consideration. Ability to provide family education is operationalized on the basis of capability level of a respondent's family for bearing educational expenditure. Scoring for the ability to provide family education, sub-score of a char woman was '0' for no ability, '1' for medium ability and '2' for high/sufficient ability to provide family education. The ability to provide family education sub-score of a respondent was computed by summing up her scores for all the four items. The possible score varied from zero to eight. Zero indicated that the respondent had no ability for bearing educational expenditure at all and eight indicated that the respondent had sufficient ability to provide educational expenditure.

### **3. Computation of Health and sanitation sub-score**

Health and sanitation sub-score was divided into three dimensions, namely availability of drinking water, toilet condition, and medicare facilities.

#### **a) availability of source of drinking water**

Availability of source of drinking water was measured on the basis of type of available source used for drinking on the present condition. Total number of items of drinking water source was six which can be judged as "pond/river", "own kacha (mud made) well", "own pucca (building) well", "others tube well", "own tube well and shallow/deep tube well of common source" and corresponding score were 1, 2, 3, 4, 5 and 6 respectively. The assigned scores for availability of drinking water varied from one to six while one indicated that the availability of drinking water of the respondents was not safe at all and six indicated that respondent's source of drinking water was safe.

#### **b) toilet condition**

Total number of items of toilet condition of the respondent was four. What type of toilet the respondents used was considered for measuring this aspect. Depending on the type of toilet the score assigned to the judgments "open place", "kacha (narrow) toilet", "half sanitary toilet" and "pucca (full sanitary) toilet" were 1, 2, 3 and 4 respectively. Possible score of toilet condition of a respondent varied from one to four, while one indicated that respondent had no facility of sanitary toilet and four indicated that there was a facility of sanitary toilet condition.

#### **c) Medicare facilities**

Medicare facility of a respondent was measured depending on the availability of a set of medicare facilities. Respondents were asked to indicate their position under each item of medicare facilities. Total number of items of medicare facilities was five, and possible range varied from zero to ten. The scores assigned to the judgments "frequently", "seldom" and "not at all" were 3, 2, and 1 respectively. Possible score was zero to ten while zero indicated that there was no medicare facility for a respondent and ten indicated that there was a highest medicare facility for a respondent. Respondent's total score was obtained by summation of all five items.

### **4. Computation of shelter and assets sub-score**

Computation of shelter and assets sub-score was divided into two dimensions, namely, shelter and family assets.

**a) shelter**

Total number of items of housing condition was eight. Shelter score of respondents was measured by checking the housing condition. Weights were assigned from zero to eight on the basis of type of housing materials they used in making their house. The shelter score of a char woman was obtained by summing the corresponding value of the particular shelter possessed by the char women. The higher is the shelter score of a char woman indicates the higher livelihood status. Thus, the possible lowest shelter score was zero and the highest shelter score was 36.

| Types of housing unit    | Weights |
|--------------------------|---------|
| No house at all          | 0       |
| Kacha house              | 1       |
| Jute stick with straw    | 2       |
| Jute stick with tin shed | 3       |
| Bamboo with tin shed     | 4       |
| Double folded tin shed   | 5       |
| Four folded tin shed     | 6       |
| Tin shed building        | 7       |
| Pucca house              | 8       |

**b) family assets**

This was measured by computing a “family asset score” on the basis of possession of twenty two selected family assets. Each respondent was asked to indicate the assets that her family possessed. The family asset score was obtained by adding the corresponding weight of the particular family asset possessed by char women. The higher the family asset score of a char woman was it indicated the higher livelihood status. If a char woman did not possess any family asset, her family asset score was zero. Thus, the possible lowest family asset score was zero and the highest family asset score was 49.

**5. Computation of clothing condition sub-score**

Total number of clothing of family members was four like winter garment, ceremonial garment, ladies garment, and gents garment. Change in clothing of family members of a respondent was operationalized depending on the capacity of the respondent to meet her needs in accordance with the expectation level during different seasons and occasions. The scores assigned to the judgments “desired level”, “below desired level” and “far below desired level” were 3, 2, and 1 respectively. Total score of a respondent was obtained by summation of her obtained score in respect of all items. Possible score varied from 4 to 12 while four indicted that the availability of clothing of family members was far below the desirable level of their needs and 12 indicated that the availability of clothing of family members was up to the desirable level of expectation.

**6. Computation of social upliftment sub-score**

Computation of social upliftment sub-score was divided into two dimensions, namely decision making ability and freedom in expenditure.

**a) decision making ability**

Researcher made a three point response category as own decision (by female), take decision together and husbands decision; and corresponding scores were 3, 2 and 1 respectively. Total score of a respondent was obtained by summation of her obtained score in respect of five items. Possible score varied from five to 15 while five indicated that in case of family decision the husband took the decision himself, and 15 indicated that the respondent took the decision herself. Total score of a respondent was obtained by summation of her obtained score in respect of all items.

**b) freedom in expenditure**

Total number of item for freedom in expenditure was three like own decision (by female), take decision together and husbands' decision; and corresponding scores were 3, 2 and 1 respectively. Total score of a respondent was obtained by summation of her obtained score in respect of five items. Possible score varied from five to 15 while five indicated that in case of expenditure the husband took the decision himself, and 15 indicated that the respondent took the decision by herself.

**Overall sustainable livelihood status**

The overall sustainable livelihood status of the respondents was measured by adding all the obtained sub-scores of the above six aspects/dimensions and is presented in Table 1.

Table 1. Overall scoring techniques of livelihood status  
Tabela 1. Ogólne techniki opisu poziomu życia

| Sl. No. | Livelihood aspects/dimensions<br>Aspekty poziomu życia                                      | Possible score<br>Skala |
|---------|---|-------------------------|
| 1       | 2   | 3                       |
| A       | Food security<br>Bezpieczeństwo żywnościowe   | 12-36                   |
| B       | Ability to provide family education<br>Możliwości zapewnienia edukacji dla członków rodziny | 0-8                     |
| C       | Health and sanitation<br>Zdrowie i warunki sanitarne  |                         |
|         | availability of source of drinking water<br>dostępność wody pitnej                          | 1-6                     |
|         | toilet condition<br>warunki higieniczne   | 1-4                     |
|         | medicare facilities<br>opieka medyczna  | 0-10                    |
|         | shelter<br>schronienie  | 0-36                    |
|         | family asset<br>majątek rodzinny  | 0-49                    |

Table 1 – cont. / Tabela 1 – cd.

| 1   | 2   | 3      |
|---|---|--------|
| E   | Clothing condition<br>Dostępna odzież                       | 4-12   |
| D   | Shelter and assets<br>Schronienie i zasoby materialne       |        |
| F   | Social upliftment<br>Promocja /awans/ społeczny             |        |
|   | decision making ability<br>umiejętność podejmowania decyzji | 5-15   |
|   | freedom in expenditure<br>swoboda w wydawaniu pieniędzy     | 5-15   |
| Total score = (A + B + C + D + E + F)<br>Ogółem = (A + B + C + D + E + F) |   | 28-191 |

Overall sustainable livelihood status could be ranged from 28 to 191, where 28 indicated low level of sustainable livelihood status and 191 indicated highest level of sustainable livelihood status of a char woman in char area.

## RESULTS AND DISCUSSION

### Sustainable livelihood status

The overall sustainable livelihood status of the char women was determined by summing the scores of livelihood indicators such as: food security, ability to provide family education, health and sanitation, shelter and assets, clothing condition and social upliftment. Based on sustainable livelihood status category the char women were classified into three categories as “low sustainable livelihood status” (40-62), “medium sustainable livelihood status” (63-85) and “high sustainable livelihood status” (86-109). More than two-fifth (67.5 per cent) of the char women were found under “medium sustainable livelihood status” compare to more than one-fifth (20.5 per cent) of them belongs to “low sustainable livelihood status” and only 12 per cent of them under in “high sustainable livelihood status”. The distribution of the char women is presented in Figure 2.

The overall situation of sustainable livelihood status of the char women in the study area is not satisfactory. This may intern result of vulnerability of household, inadequate wages, lack permanent job, poor production, seasonal flood/cyclone, inadequate access to markets, limited income source, and low opportunity for work etc. Alam et al. [2005] reported that char people enjoying a rudimentary life and lose their settlement at least three times in a life. They mostly depend on internal resources. Although they have the

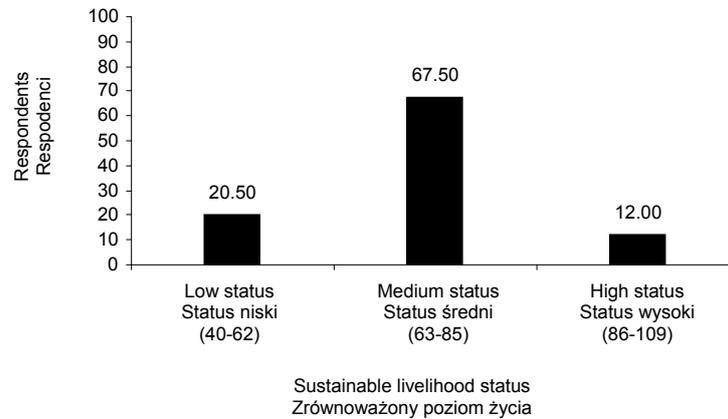


Fig. 2. Sustainable livelihood status of the char women  
Rys. 2. Zrównoważony poziom życia kobiet z terenów zalewowych

lowest per-capita income they use most of it on food consumption. According to TANGO International report [2006], food is the major per-capita expenditure (<http://foods-equrity.atlas.org/bgd/country/access/livelihoods>). So, they lose their capability for providing their family with education, health and sanitation, shelter and assets, good clothing condition, and social upliftment. Research findings indicated that vulnerable people used sixty nine per cent income on their food consumption and service holders used 49 per cent [The Daily Ittefaq 2008].

#### Variables related to sustainable livelihood status

A total of 16 selected characteristics of the char women were considered as independent variables in this study. In order to test the relationship of these characteristics to sustainable livelihood status was computed. The computed correlation coefficients are shown in Table 2.

Out of 16 independent variables, 13 namely, education, family education, family size, farm size, annual income, training experience, organizational participation, time spent in household and farming activities, agricultural knowledge, social participation, innovativeness, cosmopolitaness, extension media contact, risk orientation and participation in income generating activities were positively correlated with the sustainable livelihood status of char women. Other three variables namely, age, training experience and innovativeness had no significance.

#### Conceptual framework for the present study

The conceptual model of the present study, presented in Figure 3, was developed based on the above discussions. The framework presents the main factors that affect char women's livelihoods. These are: vulnerability context and existing structure and process which directly and indirectly influences the role performance of the char women

Table 2. Coefficient of correlation between the selected characteristics of char women and their sustainable livelihood status

Tabela 2. Współczynnik korelacji między wybranymi cechami kobiet z terenów zalewowych a ich poziomem życia

| Selected characteristics of char women<br>Wybrane cechy kobiet                                       | Correlation coefficient (r)<br>Współczynnik korelacji (r) |
|--|---|
| Age<br>Wiek  | 0.119NS   |
| Education<br>Wykształcenie   | 0.406**   |
| Family education<br>Wykształcenie członków rodziny   | 0.450**   |
| Family size<br>Rodzina (wielkość)  | 0.198**   |
| Farm size<br>Wielkość gospodarstwa   | 0.392**   |
| Annual income<br>Dochód roczny   | 0.814**   |
| Training experience<br>Doświadczenie zawodowe  | 0.071NS   |
| Agricultural knowledge<br>Wiedza rolnicza  | 0.412**   |
| Social participation<br>Uczestnictwo w życiu społecznym  | 0.407**   |
| Time spent on household and farming activities<br>Czas poświęcany na prace domowe i zabiegi rolnicze | 0.165*  |
| Organizational participation<br>Działalność w organizacjach  | 0.192**   |
| Innovativeness<br>Innowacyjność  | -0.011NS  |
| Cosmopolitaness<br>Postawa kosmopolityczna   | 0.412**   |
| Extension media contact<br>Kontakt z ośrodkami doradztwa   | 0.364**   |
| Risk orientation<br>Świadomość ryzyka  | 0.171*  |
| Participation in income generating activities<br>Uczestnictwo w czynnościach generujących dochód     | 0.209**   |

\*Significant at 0.05 level of probability, \*\*significant at 0.01 level of probability, NS = not significant.

\*Istotne na poziomie prawdopodobieństwa 0,05, \*\*istotne na poziomie prawdopodobieństwa 0,01, NS = nieistotne.

to continue their livelihoods. Institutions, organizations and policies may affect the availability, opportunities and productivity of assets while vulnerability context is the external environment in which char women operate. Char women usually play diversified role by performing different kinds of activities including household activities, on-farm activities e.g. crop production, livestock and poultry rearing, fish culture and off-farm activities like operating small business, making handicraft etc. These activities help char women to earn and increase their level of income and eventually bring food security, well being, quality and standard of living. In this way, char women reach a positive livelihood outcome. The outcome of their efforts, in relation to sustainable livelihood, varied according to their own characteristics and availability of assets. These outcomes again turn into assets for the households and they continue their livelihood activities in a cyclic order which moves them towards more sustainability. The model shows the functional relationship of the selected characteristics of char women and different factors which help to perform various types of role in order to have more secured livelihood status. In the model (Fig. 3) solid arrows indicate the cause/effect relationships which have been studied in the present research and broken arrows are used to indicate the associations which have not been studied.

### Contribution of variables to sustainable livelihood status

Linear multiple regression analysis was computed in order to determine the characteristics of char women contributing to their livelihood status. Only those variables, which had significant relationships with livelihood status, were included in the regression analysis model. Thus, a total of thirteen variables namely, education, family education, family size, farm size, annual income, training experience, organizational participation, time spent in household and farming activities, agricultural knowledge, social participation, innovativeness, cosmopolitaness, extension media contact, risk orientation and participation in income generating activities were included in the model but five variables finally entered in this model. Remaining eight variables were excluded from the model. The findings of the regression analysis are presented in Table 3.

The regression coefficients of only five variables namely, annual income, agricultural knowledge, income generating activities, family education and organizational participation were statistically significant indicating that these five variables had significant contribution to the livelihood status of char women. The other eight variables had no significant contribution to the same. It was shown in Table 4 that  $R^2$  value was 0.764 and the corresponding F value was 104.257 which was significant at 0.000 levels. The  $R^2$  value indicates that 76.4 per cent of the total variation in the sustainable livelihood status of char women was explained by the 5 variables included in the regression analysis. There existed a strong interrelation among the variables of the char women. Hence, there might have the possibility of multi-co-linearity problem for which proper contribution of the concerned variables might not have expressed exactly. Therefore, to avoid the multi-co-linearity problem and to ascertain the proper contributions of the variables, stepwise multiple regression analysis was run and the findings are presented in Table 4. It was observed from Table 3 that out of 13, only five variables *viz.* annual income, agricultural knowledge, income generating activities, family education and organizational participation met the 0.05 significance level for entry in the regression model. The results of the general linear multiple regressions are presented in Table 4. This time the  $R^2$  value was 0.763 with an F value of 125.61 (significant at 0.000 level). This final analysis indicated that 76.3 per cent

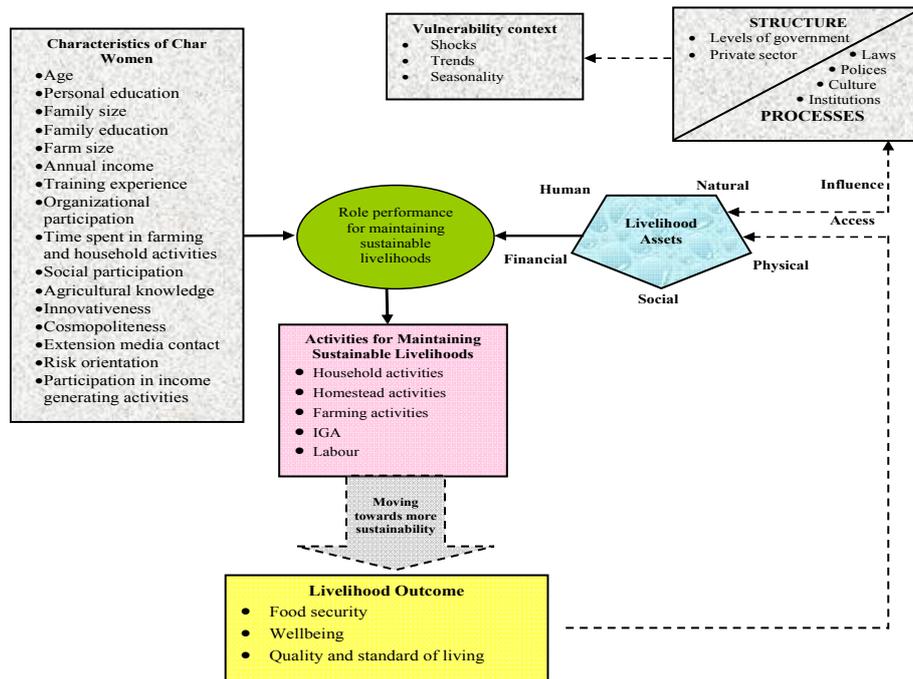
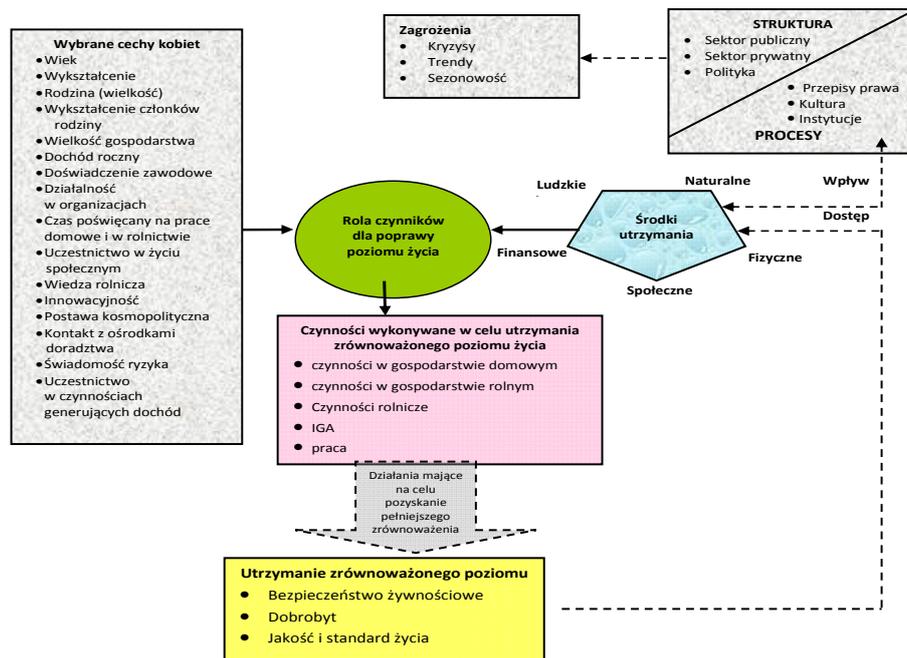


Fig. 3. Conceptual model for maintaining sustainable livelihoods



Rys. 3. Wpływ zmiennych na kształtowanie się zrównoważonego poziomu życia

Table 3. Regression coefficients of sustainable livelihood of the char women with their independent variables

Tabela 3. Współczynniki regresji zrównoważonego poziomu życia kobiet z terenów zalewowych dla zmiennych niezależnych

| Specification<br>Wyszczególnienie                           | Regression coefficients<br>Współczynniki regresji |                                | Significant level<br>Poziom istotności |
|---|---|--------------------------------|--|
|   | unstandardized<br>niestandardyzowane              | standardized<br>standaryzowane |  |
| Constant<br>Stała   | 35.21   |                                | 0.000                                  |
| Annual income<br>Dochód roczny                              | 0.583   | 0.720                          | 0.000                                  |
| Agricultural knowledge<br>Wiedza rolnicza                   | 0.309   | 0.151                          | 0.000                                  |
| Income generating activities<br>Czynności generujące dochód | 0.390   | 0.147                          | 0.000                                  |
| Family education<br>Wykształcenie członków rodziny          | 0.789   | 0.144                          | 0.000                                  |
| Organizational participation<br>Działalność w organizacjach | 1.251   | 0.107                          | 0.003                                  |

$R^2 = 0.764$ , adjusted  $R^2 = 0.757$ , F value = 104.257, P = 0.000.

$R^2 = 0.764$ , skorygowany  $R^2 = 0.757$ , wartość F = 104,257, P = 0,000.

Table 4. Regression coefficients of sustainable livelihood status of char women with their characteristics

Tabela 4. Współczynniki regresji zrównoważonego poziomu życia wraz z charakterystyką kobiet

| Specification<br>Wyszczególnienie                           | Regression coefficients<br>Współczynniki regresji |                                | t value<br>Wartość t | Significant level<br>Poziom istotności |
|---|---|--------------------------------|----------------------|--|
|   | unstandardized<br>niestandardyzowane              | standardized<br>standaryzowane |                      |  |
| Constant<br>Stała   | 34.983  |                                | 12.845               | 0.000                                  |
| Annual income<br>Dochód roczny                              | 0.864   | 0.157                          | 18.810               | 0.000                                  |
| Agricultural knowledge<br>Wiedza rolnicza                   | 0.585   | 0.722                          | 3.860                | 0.000                                  |
| Income generating activities<br>Czynności generujące dochód | 0.387   | 0.146                          | 3.919                | 0.000                                  |
| Family education<br>Wykształcenie członków rodziny          | 0.314   | 0.153                          | 3.084                | 0.002                                  |
| Organizational participation<br>Działalność w organizacjach | 1.252   | 0.107                          | 3.028                | 0.003                                  |

$R^2 = 0.763$ , adjusted  $R^2 = 0.758$ , F value = 125.61, P = 0.000.

$R^2 = 0.763$ , skorygowany  $R^2 = 0.758$ , wartość F = 125,61, P = 0,000.

of the total variation in sustainable livelihood status of the char women was explained by these five variables together in sustainable livelihood status of the char women and the rest 23.7 per cent remained unexplained.

Therefore, it could be concluded based on these findings that whatever variation was in the livelihood status, it was mainly due to the contributions of these five variables. The unique contribution by each of the variables was also determined by taking the changes in  $R^2$  value which occurred for a particular variable in the stepwise regression model. Individual contribution of five characteristics has been presented in Table 5.

Table 5. Stepwise multiple regression analysis showing contribution of the selected characteristics to sustainable livelihood status of char women

Tabela 5. Analiza krokowa regresji wielokrotnej wybranych cech w zrównoważonym poziomie życia kobiet z terenów zalewowych

| Variable<br>Zmienna   | Multiple R <sup>2</sup><br>Wielokrotne R <sup>2</sup> | Change<br>in R <sup>2</sup><br>Zmiana<br>w R <sup>2</sup> | Variation explained<br>Zmienna objaśniona<br>(%) | Significant<br>level<br>Poziom<br>istotności |
|---|---|---|--|--|
| Annual income<br>Dochód roczny                              | 0.663   | 0.663   | 66.3   | 0.000  |
| Agricultural knowledge<br>Wiedza rolnicza                   | 0.719   | 0.056   | 5.6  | 0.000  |
| Income generating activities<br>Czynności generujące dochód | 0.738   | 0.018   | 1.8  | 0.000  |
| Family education<br>Wykształcenie członków rodziny          | 0.753   | 0.015   | 1.5  | 0.002  |
| Organizational participation<br>Działalność w organizacjach | 0.764   | 0.011   | 1.1  | 0.003  |
| Total – Ogółem  |   |   | 76.3   |  |

It can be observed from the Table 5 that among the five variables, the annual income contributed 66.3 per cent, agricultural knowledge contributed 5.6 per cent, income generating activities contributed 1.8 per cent, family education contributed 1.5 per cent, and organizational participation contributed 1.6 per cent to explained variation 76.3 per cent. Annual income contributed the highest among all other variables, which accounted for 66.3 per cent in predicting sustainable livelihood status. Higher annual income of the respondents allow them to invest more in farming operations and business which ultimately leads them to come sustain in their sustainable livelihood status. The second variable entered in the model was agricultural knowledge which contributed 5.6 per cent in predicting the sustainable livelihood status. Char area is a special type of area, having lots of agricultural land but less acquainted with developed agricultural technology. Agricultural knowledge is one of the important components of char women that plays vital role to involve them in different agricultural activities effectively. The third variable entered in the model was income generating activities which contributed 1.8 per cent in predicting the sustainable livelihood status. Basically char women were always kept busy with various types of activities related to agriculture and non-agriculture for in-

creasing their income. The family education contributed 1.5 per cent in predicting the sustainable livelihood status. It helps the women to broaden their outlook and expand their mental horizon by helping them to develop correct perception and objective assessment. The last variable was organizational participation that contributed 1.1 per cent variability to the sustainable livelihood status. More organizational participation could create coordinate capability and capacity to adopt improved technology. However, those women who had more annual income, better agricultural knowledge, participation in income generating activities, more family education and more organizational participation were found to possess better sustainable livelihood status in char area.

Since stepwise regression analysis does not show separately the direct and indirect effects of the variables to sustainable livelihood status, path analysis was performed in order to fulfill this shortcoming. In the present study, path analysis was done to have clear understanding of direct and indirect effects of selected five variables which were entered into the stepwise regression model on the livelihood status. Variables through which substantial indirect effects were channelled were also explored. The 'path coefficient' of variables with respect to sustainable livelihood status of char women is shown in Table 6 and Figure 4.

Table 6. Path coefficients showing the direct and indirect effects of variables to the livelihood status of char women

Tabela 6. Analiza ścieżek pokazująca bezpośredni i pośredni wpływ wybranych zmiennych na zrównoważony poziom życia kobiet z terenów zalewowych

| Variables<br>Zmienne   | Direct effect<br>Wpływ bezpośredni | Indirect effect<br>Wpływ pośredni | Variables through which indirect effects are channelled<br>Zmienne przy pomocy których pośredni wpływ jest ukierunkowany |  |   |   |  |
|--|------------------------------------|-----------------------------------|--|--|---|---|--|
|  |                                    |                                   | annual income<br>roczny dochód   | agricultural<br>knowledge<br>wiedza rolnicza | income<br>generating<br>activities<br>czynności generujące dochód | family<br>education<br>członków rodziny | organizational<br>participation<br>uczestnictwo w czynnościach organizacyjnych |
| Annul income<br>Dochód roczny                                  | 0.722                              | 0.100                             |  | 0.034  | 0.001   | 0.058                                   | 0.007  |
| Agricultural<br>knowledge<br>Wiedza rolnicza                   | 0.153                              | 0.264                             | 0.160  |  | 0.045   | 0.045                                   | 0.014  |
| Income generating<br>activities<br>Czynności generujące dochód | 0.146                              | 0.063                             | 0.005  | 0.048  |   | -0.002                                  | 0.012  |
| Family education<br>Wykształcenie członków rodziny             | 0.157                              | 0.284                             | 0.266  | 0.021  | -0.002  |   | 0.0007   |
| Organizational<br>participation<br>Działalność w organizacjach | 0.107                              | 0.09                              | 0.050  | 0.021  | -0.001  | -0.001                                  |  |

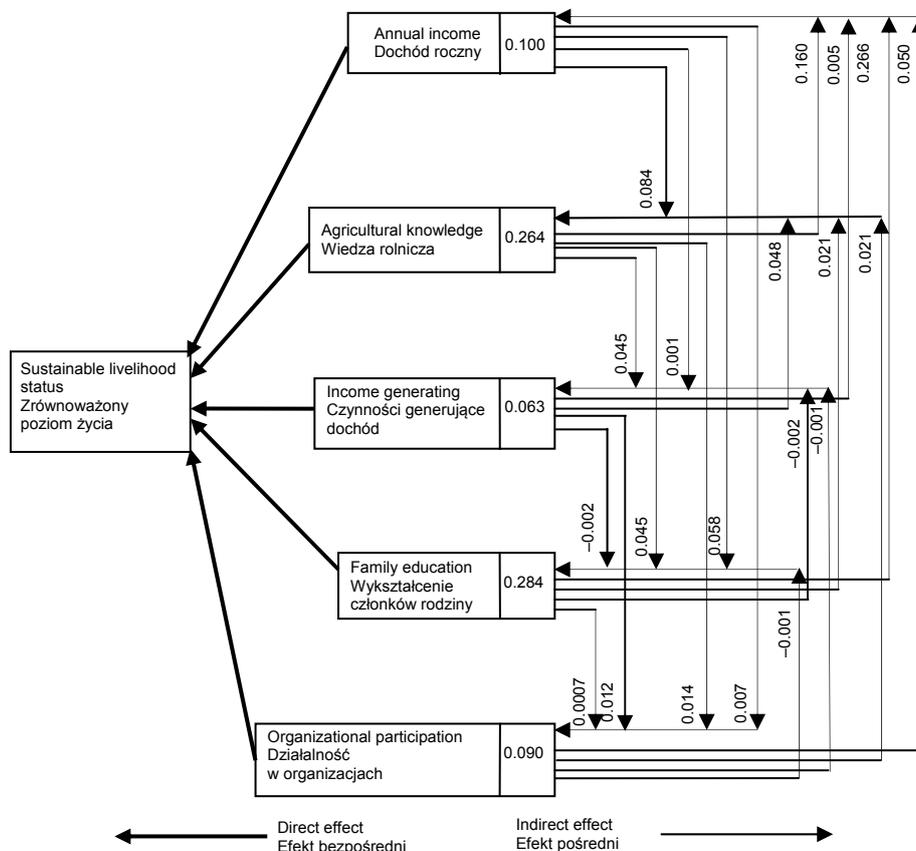


Fig. 4. Diagram showing direct and indirect effect of variables on the sustainable livelihood status  
 Rys. 4. Wykres pokazujący bezpośredni i pośredni wpływ zmiennych na zrównoważony poziom życia

Data shown in Table 6 indicated that five variables namely annual income, agricultural knowledge, income generating activities, family education and organizational participation had direct positive effect on the livelihood status of char women. Data shown in Table 7 also indicated that among the variables annual income had the highest positive value (0.722) of the direct effect on the livelihood status and its total indirect effect was 0.100, which was exerted through agricultural knowledge (0.034), income generating activities (0.001), family education (0.058), and organizational participation (0.007). Mortuza et al. [2004] found that family income had significant contribution to the livelihood. Family education had the second highest direct effect of 0.157 but substantial the highest indirect effect of 0.284, which was exerted through the annual income (0.160), income generating activities (0.045), family education (0.045) and organizational participation (0.012). All the five variables had indirect effects to various degrees on the livelihood status of char women and were channelled through each other.

## CONCLUSIONS

From the preceding discussion, it appears that due to vulnerability, livelihood status of the char women in this study is not at satisfactory level. This is due to high vulnerability. Stepwise multiple regression analysis depicted that five variables contributed significantly to the sustainable livelihood status. These variables were: annual income, agricultural knowledge, income generating activities, family education and organizational participation and they were considered as the key factors for the sustainable livelihood status of the char women. Path analysis indicated that those variables had both direct and indirect effects on the sustainable livelihood status. Therefore, attempt should be made by the government and nongovernmental organizations to arrange training programme for increasing agricultural knowledge and encourage citizens to participate in different income generating activities. An adult education and motivational programme may be arranged for increasing their level of education and involvement of different organizational participation respectively.

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## CZYNNIKI DETERMINUJĄCE ZRÓWNOWAŻONY POZIOM ŻYCIA Kobiet z terenów zalewowych Bangladeszu

**Streszczenie.** Głównym celem badania było określenie udziału zmiennych wpływających na zrównoważony poziom życia kobiet z terenów zalewowych. Pomiaru zrównoważonego poziomu życia dokonano w oparciu o wskaźnik, który uwzględniał sześć zmiennych: bezpieczeństwo żywnościowe, zdolność do zapewnienia edukacji rodzinie, zdrowie i warunki sanitarne, schronienie i majątek rodziny, stan odzieży oraz poprawę sytuacji społecznej. Dane do badania pochodzą z wywiadu przeprowadzonego w okresie od listopada 2006 roku do marca 2007 roku wśród 200 losowo wybranych kobiet z terenów zalewowych z dwóch dystryktów Bangladeszu: Upazila i Jamalpur. Ponad połowa (67,5%) kobiet z terenów zalewowych określiła swój poziom życia jako średni, podczas gdy według 1/5 (20,5%) poziom ich życia był niski. Tylko 12% określiło swój poziom życia jako wysoki. Współczynnik korelacji Pearsona wykazał, że spośród 16 zmiennych 13 miało dodatni, istotny statystycznie, wpływ na badane zjawisko. Wyniki analizy regresji krokowej wykazały, że pięć zmiennych: dochód roczny, wiedza rolnicza, działalność generująca dochód, wykształcenie rodziny oraz uczestnictwo w organizacjach w 76,3% wyjaśniło zmienność w ocenie poziomu życia. Analiza ścieżkowa wykazała, że zmienne te wywierają zarówno bezpośredni, jak i pośredni wpływ na badane zjawisko. Grupa kobiet o większych rocznych dochodach, lepszej wiedzy rolniczej i wykształceniu, uczestniczących w działalności generującej dochód oraz częściej uczestniczących w organizacjach, charakteryzowała się wyższym poziomem życia. Konieczne jest, aby rząd i inne instytucje, odpowiedzialne za prowadzoną politykę, w programach mających na celu podniesienie poziomu życia zwracały uwagę na te aspekty, które, zgodnie z wynikami przeprowadzonego badania, przyczyniają się do poprawy poziomu życia kobiet na terenach zalewowych w Bangladeszu.

**Słowa kluczowe:** zrównoważony poziom życia, zmienne wywierające wpływ, tereny zalewowe, kobiety

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