

Research Article**PSYCHOMETRIC EVALUATION OF MASLACH BURNOUT INVENTORY (MBI-ES) FOR TEACHERS IN BANGLADESHI CONTEXT****Shamima Akter***, Fatema-Tu-Zohra Binte Zaman and Md. Torikul Islam*Department of Psychology, Jagannath University, Dhaka 1100, Bangladesh**Received: 23 September 2021, Accepted: 17 June 2022***ABSTRACT**

The current study was intended to adapt and ascertain the psychometric properties of the Maslach Burnout Inventory (MBI-ES) for teachers with the Bangladeshi population. The Inventory has three subscales: emotional exhaustion, depersonalization, and personal accomplishment, comprises 22 items. Items were translated into Bangla and evaluated by judges in terms of their literal and thematic meaning in the context of Bangladeshi culture. The evaluation of each of the judges was assembled and a draft scale was prepared. To finalize the Bangla version of the scale items modification was followed by pilot testing on 20 respondents. A cross-sectional study was carried out with 200 teacher respondents, age ranged 25- 55 years and the mean age was 39 years, following the purposive sampling technique. Reliability was established by computing Cronbach alpha and test-retest reliability found .778 and .890 for emotional exhaustion, .764 and .960 for depersonalization, and .817 and .999 for personal accomplishment respectively. Validity was confirmed through content and convergent method. This inventory will help to create awareness whether burnout is an issue that need to notice by assessing burnout among teacher groups in Bangladesh.

Keywords: *Maslach Burnout Inventory-ES, adaptation, reliability, validity, teacher***Introduction**

Burnout is a condition of bodily, effective, and psychological collapses derived from extreme and persistent strain. In 2001, Maslach *et al.* illustrate workplace burnout as manifested by constant, prolonged responses that emerged from emotional and interpersonal stressors relating to the job. The basis on Maslach's theoretical framework (Maslach and Jackson 1981, Maslach *et al.* 1986) burnout has been characterized by three elements; i) *emotional exhaustion*, which manifests when individuals are inept to present themselves psychologically to the degree that is expected from them and are therefore behaviorally inapt at devoting in an effort towards performing, ii) *depersonalization* involves isolated and withdrawal relationship with their colleagues and

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maintaining unfriendly relationships and remote contact, and iii) the feeling of reduced *personal achievement*, consequences from adverse self-evaluations, and involves in reducing of productivity and the resignation of any attempt to act upon. Common associated factors of burnout consist of overwork, social conflict, and persistent stressors (Maslach *et al.* 2001), which may vary by the cultural environment. Moreover, burnout has been linked with negative workplace deeds such as increases in sick leave, early retirement (resignation), frequent job changes, alcohol abuse, increases in the consumption of coffee and smoking, familial, social, and economic problems, industrial accident, disruptions in the condition of quality of service and low morale, (Bakker *et al.* 2000, Chatzimihaloglou *et al.* 2005). Burnout decreases efficiency, productivity and weakens energy contrary it increases helplessness, hopelessness, distrustfulness, and bitterness (Michael *et al.* 2009, Rupert and Kent, 2007). The depressing effects of burnout spread out into every part of life including home, work, and social life (Demerouti *et al.* 2001, Leiter *et al.* 2007). To reduce the negative effects of burnout it is necessary to assess burnout among employee.

Presently Maslach Burnout Inventory-MBI (Maslach and Jackson, 1981) has four versions intended for: the general population (MBI-GS), professionals with large human involvement (MBI-HSS), teachers (MBI-ES), and students (MBI-SS) (Maslach *et al.* 2001). The general MBI is consists of 22 items encompasses 3 components i) feelings of overwhelming emotional exhaustion (EE; nine items), ii) depersonalization and detachment from the job (DP; five items), and iii) inefficacy or lack of personal accomplishment (PA; eight items). A higher score on EE and DP, and a lower score on PA, correspond to a higher level of burnout. Considering the literature “Maslach Burnout Inventory (MBI)” is the maximum extensively used self-report device that has been translated into several languages to assess burnout syndrome. The most recent version of the tool is the MBI-Educator’s Survey (Maslach *et al.* 1996) which has established confirmation for its psychometric properties and factor structure across a large sample of US teaching professionals. A Meta-analytic review conducted by (Worley *et al.* 2008) on 45 studies, included 20 studies specific to the MBI-ES. Among the eleven of these studies, he found exploratory factor analytic support for 3 factor and 22 item versions of the MBI-ES. For assessing construct validity of burnout inventory exploratory factor analytic (EFA) and confirmatory analytic (CFA) methods were used. Criteria specified eigenvalues greater than 1, structure coefficients greater than .40, scree plot ‘elbow’ interpretation, and a combination of each, to retain 3-factor solutions (Worley *et al.* 2008). Reliability investigation of the MBI-ES consistently give in similar alpha coefficients for the 3-factor structure; Emotional Exhaustion (EE) .83- .91, Depersonalization in the workplace (DW): .50 -.79, and Personal Accomplishment (PA): .69-.82, across studies (Aluja *et al.* 2005). In the education system measuring burnout through the MBI-ES is gold standard. The structure of three subscale has been convincing and robust across cultures (Denton *et al.* 2013).

Burnout is a common experience that has been recognized and considers to study in diverse cultures (Maslach *et al.* 2001). Nevertheless, cross-cultural evaluations of burnout have agreed in varied outcomes. A study comparing between European and North American teacher have seen a high average of exhaustion and cynicism among North American teacher due to relatively increased competition on the job and/or higher work demands (Maslach *et al.* 2001). It was

believed that for the dominant role of religion in cultures teachers may be competent to manage and agree to job-related stressors (Koki *et al.* 2000). Another comparative study of burnout found lower depersonalization in the workplace among native ancestry groups with European teachers. In explaining the result native teachers are noticeable chances to get social support and able to vent their frustrations (Pienaar and Van Wyk 2006). The analysis of cultural distinction in burnout may provide significant understandings about risk factors for, and the anticipation of, teacher exhaustion. Kristensen *et al.* (2005), describe MBI-ES some ideas are represented by the items that were too American. So, the above literature describes the cultural differences that exist in the construct of burnout. For this, the purpose of the present study is to validate the MBI-ES construct across Bangladesh with teacher samples.

Yet, teachers are an employee in an institution their job nature is different from others. There are several reasons behind the interest in teacher burnout. Firstly, the teaching career is one of the major and utmost noticeable occupations in Bangladesh. Secondly, teachers execute a key role to educate students in academic and skill areas, involved in different activity, meet the desires of students with a wide range of capabilities, and stimulating moral and ethical development. Teachers have a pressure to change social problems (juvenile delinquency, drug problem). Thirdly, a number of national reports have illustrated though a few numbers are choosing to become teacher but the fact that many teachers are not interested to go on this profession and some are leaving. This has resulted in insufficiencies of teacher in certain disciplines and estimates of forthcoming shortage in all areas. It demands a high level of concentration in teacher burnout and the need for further investigation in this specific area. In that case, different measures are needed to measure burnout. In the context of Bangladesh, numerous studies were carried out to see the burnout among employees (Shimul and Islam 2009) and teachers (Sharmin 2018) using MBI-GS. No standardized measure has yet been developed or adapted in Bangladesh to assess burnout, especially for teachers. Moreover, the creation of a new instrument is complex and time-consuming. But, MBI-ES is specially designed for teachers to measure burnout. In that case, measuring teacher burnout through a standardized Bangla version of a rating scale like MBI-ES will be more authentic, reliable, and valid to meet this requirement. In light of all these explanations, the main intention of this research is to carry out to adapt the teacher Burnout inventory in the context of Bangladesh including to assess the reliability, and validity of the measures.

Materials and Methods

Participants

A total of 200 primary school teacher respondents (100 urban and 100 were rural school teachers), age ranging from 25 years to 55 years and the mean age= 39 years, were taken on basis of purposive sampling technique from the different schools of Bangladesh. Among them 1% were lower class, 97% were middle class and 2% were upper class. The educational qualification reported by the participants 9% completed HSC, 76% achieved an Honor's degree and 15% completed Master's degree. A cross-sectional survey research method was used for this research. The study was carried out from August to December in 2019.

Description of Maslach Burnout Inventory. The Maslach Burnout Inventory (Educators Survey) (MBI-ES) originally developed by Maslach and Jackson (1981) consistent and standardized instruments used to assess the experiences of burnout of teachers. The Inventory contains 22 items, with three subscales: *emotional exhaustion* (EE 9 items= 1 to 9 items, assess feeling, emotionally exhausted from their work); *depersonalization* (DW-5R = 10 to 14 items, assess the degree of distancing and indifference admitted by the subject); and *personal accomplishment* (PA-8 items= 15 to 22 items assess feelings of self-efficacy and personal accomplishment). Six-point Likert type response format was used from 1 (never), 2 (very rarely), 3 (rarely) 4 (sometimes), 5 (frequently), and 6 (very frequently). The participants with high scores on the emotional exhaustion (score >27) and depersonalization (score > 13) subscales and low scores on the personal accomplishment (score < 33) subscale were considered to have symptoms of burnout. The reliability of Cronbach alpha of the three subscales of original MBI-ES was found .90 for emotional exhaustion, .76 for depersonalization and .76 personal accomplishments studied on 462 California teachers.

Procedures

The translation, adaptation, and cultural validation progression of the Maslach Burnout Inventory (Educators Survey) (MBI-ES) was accomplished by maintaining the strategies of ITC (Hambleton 2001, Vijver and Hambleton 1996). The adaptation of the MBI-ES consisted of the following four phases.

Phase 1. Translation phase: Forward and backward translation. The first *forward translation of the items of the scale was prepared by researchers*. Then the translated form of Bangla items along with an original version of the scale was given to five judges from the Department of Psychology and three judges from the department of English Jagannath University, Dhaka, Bangladesh for appropriateness of each item of Burnout inventory (ES). They are requested to check the translation from comparing with the original scales on content, language construction, clarity of the expression, conceptually appropriate words or phrases and provide correction if necessary. Also, they were asked to rate the statements on a dichotomous scale (for translation: correct or incorrect and for culturally sensitive: relevant or irrelevant).

Then the initial synthesized translated Bangla version was given to the two teachers of Psychology who are proficient in both English and Bangla languages and three departments of English, Jagannath University. On basis of their comments, all the ambiguities and discrepancies were discussed and resolved by the researcher then the second synthesized translated Bangla version was prepared. Ensuring the same meaning in the translated version as the original was describing the content validity of this inventory.

Phase 2. Pilot testing of the pre-final version of the instruments. The pre-final Bangla version of the instruments was administered to 20 primary school teachers to check the correctness of the items about their meaning and complexity. Participants were requested to rate the statements on a dichotomous scale (clear or unclear), if the answer is unclear then requested to provide a suggestion. It was done to improve the content equivalency and improve the structure of the sentences used in the instructions and the items of the pre-final version.

Phase 3. Field testing phase. To check the validity of the items of the revised preliminary Bangla version of Maslach Burnout Inventory pre-testing-II was carried out. After synthesizing all the documents, the Bangla version of the Maslach Burnout Inventory was administered to 200 primary school teacher participants among them 100 were urban primary school teachers and 100 were rural primary school teachers. The age range of the participants was 25 years to 55 years and the mean age of the participants was 39 years. The participants were asked to choose the appropriate statement which reflects their feelings by ticking (√) on each item. They were assured that provided information will kept confidential and would be used only for research purposes.

Phase 4. Determine reliability and validity. To determine the test-retest reliability, the inventory was administered to 30 primary school teachers interested to participate after seven days had filled up the Bangla version of the Maslach Burnout Inventory earlier. Then, the reliability (internal consistency and test-retest) and validity of the scale (content: the scale was judged independently and convergent validity) were determined with the help of SPSS.

Results and Discussion

The findings of this study involved the analysis of the coefficients of reliability and convergent validity. The results were presented in Table 1 through Table 5

Item Analysis. Items analysis is done by assessing the correlation of individual item scores with the total score. For the adaptation, all the 22 items (Appendix) were thoroughly analyzed and the corrected item-total correlation coefficient was calculated. Item-total correlation points toward the internal consistency of the scale. A higher item-total correlation of an item indicates the concordance of that item with the construct being measure by the scale. The item-total correlation of all the items of the Maslach Burnout Inventory is presented in Table 1.

Table 1. Item-total correlation and the reliability in the field test of Adapted Bangla version of Maslach Burnout Inventory (N=200).

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach Alpha if Item Deleted
1	66.36	140.55	.437	.744
2	65.81	141.08	.486	.742
3	65.97	135.71	.599	.733
4	65.86	138.97	.450	.743
5	65.82	139.55	.506	.740
6	65.71	147.90	.299	.754
7	65.66	145.27	.375	.750
8	65.72	146.21	.319	.753
9	65.69	148.37	.232	.758
10	65.81	143.66	.412	.747
11	65.77	145.19	.355	.750

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach Alpha if Item Deleted
12	65.66	142.95	.390	.748
13	65.75	144.54	.335	.752
14	65.49	142.71	.417	.746
15	65.48	146.17	.294	.754
16	65.19	152.16	.109	.766
17	65.04	152.44	.085	.769
18	66.40	149.59	.153	.765
19	65.93	148.31	.208	.760
20	65.74	149.74	.171	.763
21	65.45	151.77	.134	.764
22	65.29	150.10	.159	.764

Internal consistency

Table 2. The number of items and internal consistency of the Adapted Bangla version of Maslach Burnout Inventory (N=200).

Adapted Bangla version of Maslach Burnout Inventory	No. of Item	Total Item	Internal Consistency
Emotional Exhaustion (EE)	01-09	09	.778
Depersonalization (DP)	10-14	5	.764
Personal Accomplishment (PA)	15-22	8	.817

The internal consistency of test items was emotional exhaustion .778, depersonalization .764, and personal accomplishment .817. It recommended that the internal consistency of the MBI-ES scale was satisfactory.

Determining reliability

The reliability coefficient of the Bangla version of the Maslach Burnout Inventory was assessed by Cronbach's alpha, test-retest reliability methods. These results are shown in following table 3 and 4

Cronbach's alpha

Cronbach's alpha was calculated to determine the internal consistency reliability in the *Maslach Burnout Inventory*. This value found highly considerable with an α level of .01 (Table 3).

Table 3. Cronbach's alpha for the Adapted Bangla version of Maslach Burnout Inventory (N=200).

<i>Maslach Burnout Inventory Alpha (Number of Items 22)</i>			
Sub-Scales	<i>EE</i>	<i>DP</i>	<i>PA</i>
<i>Cronbach's alpha</i>	.753	.792	.743

Table 4. Test-retest Reliability of the Adapted Bangla version of Maslach Burnout Inventory (N=200).

<i>Maslach Burnout Inventory Alpha (Number of Items 22)</i>			
<i>Sub-scales</i>	<i>EE</i>	<i>DP</i>	<i>PA</i>
<i>Test-retest reliability</i>	.890**	.960**	.999**

The test-retest reliability of the three subscales was found high emotional exhaustion ($r=.890$), depersonalization ($r=.960$), and personal accomplishment ($r=.999$) at $p < .01$ level.

Determining validity

The validity of the translated Bangla version of the Maslach Burnout Inventory was determined by content and convergent validity. Content validation of the adapted Bangla form of the scale was determined by the experts' opinions on the translated items, instructions, and response format. Moreover, to assess the convergent validity of the instruments, inter-correlations among the subscale of the Adapted Bangla version of Maslach Burnout Inventory were determined. These provided shreds of evidence for the internal structure of the instrument. The correlation among the subscales emotional exhaustion (EE), depersonalization (DW), and personal accomplishment (PA) are presented in Table 4.

Table 5. Inter-Correlations among the Subscales of the Adapted Bangla version of Maslach Burnout Inventory (N = 200).

Variables	1	2	3
1. Emotional Exhaustion	-		
2. Depersonalization	.656**	-	
3. Personal Accomplishment	-.242**	-.297**	-

** Correlation is significant at the .01

*Correlation is significant at the .05 level (2-tailed)

Overall, the scores of the Adapted Bangla version of the Maslach Burnout Inventory were meaningfully correlated with each other within the field test group. A remarkably high positive correlation ($r=.656$) was observed between the scores on emotional exhaustion and depersonalization which indicates teachers have higher emotional exhaustion (EE) has higher lack of involvement in their job. On the contrary, a negative correlation was observed between the scores on emotional exhaustion and personal accomplishment ($r=-.242$) among teachers, be a sign of exhausted teachers have a lower level of self-efficacy. Similarly, the negative correlation of depersonalization and personal accomplishment ($r= .297$) also signifies low achiever teachers were not concerned and involved in their job.

The aim of the present study was to adapt the widely used Maslach Burnout Inventory (MBI-ES) to be administered in Bangladesh and to determine the psychometric properties of the Bangla version of the instrument. It has been seen that employee's burnout was measured by MBI-GS. Though teachers are an employee in an institution their job nature is different from others. In that

case, different measures are needed to measure burnout. The creation of a new instrument is complex and time-consuming, for this reason, the present author preferred the original Maslach Burnout Inventory (MBI-ES) to adapt and validate in Bangla, which is already reliable and valid. To promote valid and standardized methods for evaluating burnout and fostering the generalization of findings as well as intercultural research replications, this MBI Bangla was validated. The adaptation process was carried out following the ITC guidelines. The outcomes of the present study make sure the usability of MBI-ES in Bangladesh. An exploratory item analysis was performed on the 22 items from the MBI for adaptation and the item-total correlation coefficient was strong and satisfactory.

The internal consistency and test-retest reliability for each of the Bangla versions of MBI subscales were carried out to establish the reliability of the Bangla version of MBI-ES and found extremely favorable. Cronbach's alpha was measured to determine the internal consistency, and the value was found .778 for emotional exhaustion, .764 for depersonalization, and .817 for personal accomplishment respectively which is usually considered as very good reliability of internal consistency (De Vellis 1991). These findings are satisfactory and compatible with previous research (Aluja *et al.* 2005). To establish the consistency of the present scale in assessing burnout was administered to them two times with an interval of two weeks. The correlation between scores on the two administrations was (emotional exhaustion .890, depersonalization .960, and personal accomplishment .999) indicates that the adapted Bangla version of the MBI-ES is highly reliable.

Content validity and convergent validity have assured the validation of the instrument. The content validity of the adapted Bangla version of MBI-ES was determined by the experts in the psychology field during the translation process and they suggested that in the context of Bangladesh, this scale is valid. This systematic evaluation indicates the content validity of the scale. The construct validity of the present scale was accumulated from convergent validity (Domino 2000). The convergent validity of the subscale emotional exhaustion, depersonalization personal accomplishment of this scale was found satisfactory. Thus, the findings of the Bangla version of MBI are suitable for assessing the experience of teacher burnout in the context of Bangladesh.

To ensure the excellence of the measuring instruments needs follow-up studies and review to overcome the problems related to the content of the scale. Present scale, the data were taken only from school teachers. Wide variety of sample for instance university and college teacher should be included in follow up studies. Although the coefficient of reliability is satisfactory, it would be better if a representative sample could be collected from various types and levels of participants (teachers) from all over the country. Further, the present study neglected to test divergent validity, it is recommended to examine the divergent validity of the present scale.

Conclusion

To assess burnout among working people only the adapted Bangla version of MBI-GS is used in our country. The Adapted Bangla version of MBI-ES will be another assessment tool for use in Bangladesh to assess burnout among teacher groups and help people to develop consciousness of whether burnout is an matter of subject that need to address. It creates awareness that a problem be real can be the first step to alleviate any kind of job burnout. The present scale will meet that need and the findings can serve as a base or open the door of further research.

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Appendix

Maslach Burnout Inventory

নিম্নলিখিত উক্তিগুলো মনোযোগ দিয়ে পড়ুন। প্রতিটি উক্তির পাশে ৬টি করে বিকল্প উত্তর রয়েছে। যেকোন একটি উত্তরে (✓) চিহ্ন দিয়ে চিহ্নিত করুন। এখানে সকল উক্তিই সঠিক তাই অনুগ্রহ করে প্রতিটি উক্তির ক্ষেত্রে আপনার মনোভাব প্রকাশ করুন। আপনার উত্তরের গোপনীয়তা রক্ষা করা হবে এবং কেবল গবেষণার কাজে এ তথ্য ব্যবহার করা হবে।

ক্রমিক নং	উক্তি সমূহ	কখনই না	খুব কম	কম	মাঝে মাঝে	প্রায়ই	সব সময়
১	আমার কাজকে প্রায়ই প্রাণহীন মনে হয়।						
২	সারাদিন কাজ করার পর পরিশ্রান্ত হয়ে গিয়েছি বলে মনে হয়।						
৩	আমি যখন সকালে উঠি এবং কাজের জন্য আরও একটি দিনের মুখোমুখি হতে হবে এই ভেবে তখন ক্রান্তবোধ করি।						
৪	সারাদিন মানুষের সাথে কাজ করা আমার জন্য সত্যিই পীড়াদায়ক।						
৫	আমি আমার কাজের প্রতি অনীহা অনুভব করি।						
৬	আমি কর্মক্ষেত্রে খুব বেশি পরিশ্রম করছি বলে মনে হয়।						
৭	মানুষের সাথে কাজ করতে গিয়ে আমি প্রচণ্ড মানসিক চাপ অনুভব করি।						
৮	আমার কোন দৈর্ঘ্য শক্তি নেই বলে মনে হয়।						
৯	আমি মনে করি সহকর্মীরা তাদের কিছু সমস্যার জন্য আমাকে দায়ী করে।						
১০	আমি আমার কিছু সহকর্মীদের একেজো মনে করি।						
১১	চাকুরীটি গ্রহণ করার পর থেকে কখনো কখনো নিজেকে অন্যদের প্রতি অপেক্ষাকৃত কম অনুভূতিশীল বলে মনে করি।						
১২	আমি ভেবে উদ্ভিগ্ন যে চাকুরীটি আমাকে মানসিকভাবে কঠিন কণ্ডে তুলছে।						
১৩	আমার চাকুরী নিয়ে আমি একেবারেই হতাশ।						
১৪	সহকর্মীদের সাথে কি হয় তা নিয়ে আমি একেবারেই চিন্তিত নই।						
১৫	সহকর্মীরা আমাকে ভুল বুঝছে কিংবা প্রশংসা করছে তা আমি সহজেই বুঝতে পারি।						
১৬	আমি আমার সহকর্মীদের সাথে সম্পর্কযুক্ত সমস্যাগুলির সাথে খুব কার্যকরভাবে মোকাবিলা করি।						
১৭	আমি মনে করি আমার কাজ অন্যের জীবনে ইতিবাচক প্রভাব ফেলছে।						
১৮	আমি কর্মশক্তি অনুভব করি।						
১৯	আমি আমার সহকর্মীদের সাথে সহজেই একটি স্বাচ্ছন্দ্যময় পরিবেশ তৈরি করতে পারি।						
২০	আমার সহকর্মীদের সাথে কাজ করার পর আমি আনন্দ বোধ করি।						
২১	চাকুরীর মাধ্যমে আমি অনেক কিছু অর্জন করতে পেরেছি।						
২২	আমার কাজে আমি আবেগগত সমস্যাগুলি খুব শান্তভাবেই মোকাবিলা করতে পারি।						

INSTRUCTIONS FOR AUTHORS

The *Jagannath University Journal of Life and Earth Sciences* (JnUJL&ES) is an official journal of the Faculty of Life and Earth Sciences of Jagannath University. The aim of the journal is to publish articles based on original empirical and innovative research work in different areas of science. The final goals of the journal are to develop, promote, and explore the scientific invention/discovery. It invites authors from all over the world. It is committed to maintaining international standards, quality, and provisions. Three types of the article could be submitted:

- a) Full article
- b) Review article
- c) Short communication

Manuscript Preparation for Full Article

The manuscript must be written in English and typed by Times New Roman 12-points with double space on good quality and (A4) size bond paper and sufficient margins (left and top 3.8cm, right and bottom 2.5cm). All the headings and subheadings will remain bold 14-points and 12-points, respectively. It should be submitted to the Chief Editor at the Faculty address and a soft copy through email. The board of editors deserves the final right to accept or reject any paper submitted after review. The manuscript of a full paper should be limited to ten typed pages including tables, figures, graphs, references, etc. At least 2 sets of hard copies (including one original) along with a soft copy must be sent. The manuscript should contain conventionally the following sub-titles in sequence: Title, Abstract, Keywords, Introduction, Materials and Methods, Results and Discussion, Conclusion, Acknowledgement (if any), and References. In case of 'Short Communication' no subtitles are necessary.

1. Title: The title of the article should be brief, specific, and representative with a full capital letter, bold, and 14-points. The manuscript will have a separate title page giving the name of the article, author(s) name, affiliations, and a running head. The second page should carry again the title of the article with abstract to be followed by the introduction and others according to sequence but without the author's name.

2. Abstract: The abstract should not exceed 200 words which include only the gist of the paper giving very condensed details.

3. Keywords: It should be 5-7 words typed as *italic*.

4. Introduction: It should be concise with the hypothesis and design, and also precisely relevant to the study.

5. Materials and Methods: This section will describe the special/standard methods that should be cited only as references and should not be described except if any modification has been made or a new setup has been described, which should be stated.

6. Results and Discussion: This section will include results obtained, figures, tables/graphs, and photograph. If the result is given in the body of the text table/graph is not necessary and vice-versa. Where the table is given no graph is needed and vice-versa. It then follows a conventional discussion.

7. Tables, Graphs, and Figures: The paper should contain a minimum number of tables, graphs, and figures. The graphs and figures should be drawn in indelible ink on tracing papers and that properly be labeled. The figures and graphs should be properly drawn with bold, solid lines so that these could be reduced up to half or less of the original. The photographs should be submitted on glossy papers. Legends of the graphs and figures should be typed and given separately at the end of the text.

8. Conclusion: This section will include the whole research story from the starting to the end in the Summarized form.

9. Acknowledgement: The Acknowledgements of the person, funding, grants, institute, etc should be cited in brief.

10. Reference: In the text, references should be cited within first brackets quoting the author's surname and the year of publication in the appropriate place e.g. (Bhuiyan 1964), (Khaleque *et al.*, 1970). References should be arranged alphabetically according to the author's surname at the end of the paper. The name of the journal and the name of the publisher of the book should be in italic giving edition, year of publication. Examples are given below:

Islam, M.S., Sattar, M.R. and Rahman, M.M. (2001). Psychophysical Health in Relation with the Environmental Noises. *Journal of Acoustical Society of America*, 2(1): 250-260.

Sultan, M.S. (1991). Insect Pests of Tropical Food legumes. John Willey and Sons. New York, 485.

For Review Article

Submission of reviews and perspectives covering topics of current interest are welcome and encouraged. Reviews should be concise and no longer than 8-10 printed pages (double space).

For Short Communications

Short communication is suitable for recording the results of complete small investigations or giving details of new models, innovative methods, techniques, or apparatus. The style of the main sections need not conform to that of full-length papers. It is 2 to 4 printed pages in length.

Off-prints

The corresponding author of each paper is entitled to get 10 off-prints free of cost.

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Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, or thesis) that is not under consideration for publication elsewhere; that if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher.