**Nutritional status of children with neurodevelopmental disorders: A cross-sectional study at a tertiary-level hospital in northern Bangladesh.**

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**Table 1: Bio-demographic status of children with NDD and their parents (n=157)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | | | | | Number | | | Percentage | |
| Age in months | | | | | | | | | |
| <24 | | | | | 33 | | | 21 | |
| 25-48 | | | | | 42 | | | 26.8 | |
| 49-72 | | | | | 27 | | | 17.2 | |
| 73-96 | | | | | 15 | | | 9.6 | |
| 97-120 | | | | | 24 | | | 8.9 | |
| >120 | | | | | 26 | | | 16.6 | |
| Total | | | | | 157 | | | 100 | |
| Mean age | | | | | 63.68 | | |  | |
| Range | | | | | 6-144 | | |  | |
| SD | | | | | 42.95 | | |  | |
| Sex | | | | | | | | | |
| Male | | | | | 90 | | | 57.3 | |
| Female | | | | | 67 | | | 42.7 | |
| Total | | | | | 157 | | | 100 | |
| Clinical diagnosis | | | | | | | | | |
| Cerebral palsy | | | | | 43 | | | 27.4 | |
| Cerebral palsy with epilepsy | | | | | 39 | | | 24.8 | |
| Epilepsy | | | | | 10 | | | 6.4 | |
| Down syndrome | | | | | 11 | | | 07 | |
| Autism spectrum disorder | | | | | 21 | | | 13.4 | |
| ADHD | | | | | 05 | | | 3.2 | |
| Speech delay | | | | | 15 | | | 9.6 | |
| Developmental delay | | | | | 10 | | | 6.4 | |
| Intellectual disability | | | | | 03 | | | 1.9 | |
| Total | | | | | 157 | | | 100 | |
| Residence | | | | | | | | | |
| Urban | | | | | 37 | | | 23.6 | |
| Semi-urban | | | | | 12 | | | 7.6 | |
| Rural | | | | | 108 | | | 68.8 | |
| Total | | | | | 157 | | | 100 | |
| Monthly Family income (BDT/USD) | | | | | | | | | |
| <10000 (<101 USD) | | | | | 67 | | | 42.7 | |
| 11000-25000 (102-240 USD) | | | | | 46 | | | 29.3 | |
| 26000-35000 (241-342USD) | | | | | 16 | | | 10.2 | |
| ≥35000 (≥342USD) | | | | | 28 | | | 17.8 | |
| Total | | | | | 157 | | | 100 | |
| Family type | | | | | | | | | |
| Nuclear | | | | | 109 | | | 69.4 | |
| Extended | | | | | 48 | | | 30.6 | |
| Household size | | | | | | | | | |
| Small Family 1-3 Members | | | | | 28 | | | 17.8 | |
| Medium Family4-5 Members | | | | | 78 | | | 47.1 | |
| Large Family≥6 Members | | | | | 55 | | | 35 | |
| Total | | | | | 157 | | | 100 | |
|  | Father | | | | | | Mother | | |
| Number | | Percentage | | | | Number | | Percentage |
| Education | | | | | | | | | |
| No formal Education | | 31 | | 19.7 | | 13 | | | 8.3 |
| Up to Primary | | 26 | | 16.6 | | 24 | | | 15.3 |
| Below SSC | | 30 | | 19.1 | | 48 | | | 30.6 |
| SSC | | 22 | | 14 | | 32 | | | 20.4 |
| HSC | | 11 | | 7 | | 14 | | | 8.9 |
| Bachelors | | 16 | | 10.2 | | 12 | | | 7.6 |
| Masters and above | | 21 | | 13.4 | | 14 | | | 8.9 |
| Total | | 157 | | 100 | | 157 | | | 100 |
| Occupation | | | | | | | | | |
| Govt. Service | | 7 | | 4.5 | | 7 | | | 4.5 |
| Other Service | | 20 | | 12.7 | | 5 | | | 3.2 |
| Business | | 51 | | 32.5 | | 3 | | | 1.9 |
| Day labor | | 14 | | 8.9 | | 01 | | | 0.6 |
| Farmer | | 35 | | 22.3 | | - | | | - |
| Housewife | | - | | - | | 135 | | | 86 |
| Unemployed | | 01 | | 0.6 | | - | | | - |
| Others | | 29 | | 18.5 | | 06 | | | 3.8 |
| Total | | 157 | | 100 | | 157 | | | 100 |

**Table 2: Nutritional status of the study population (n=157)**

|  |  |  |
| --- | --- | --- |
| Nutritional indices reported as Z score | | |
| Categories | Weight for height (WHZ) /  BMI for age Z score (BAZ) | Children’s height/length for age Z score (HAZ) |
| Z Score | f (%) | f (%) |
| ≤-3 SD | 14 (8.9) | 29 (18.5) |
| -2.99 to -1 SD | 61(38.8) | 61 (38.8) |
| -0.99 to 1.99 SD | 65(41.4) | 67(42.7) |
| ˃2 SD | 17(10.8) | - |
| Total | 157(100%) | 157(100%) |

**Table 3: Nutritional status and children’s clinical diagnosis (n=157)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| variables | Nutritional status | | x2 | P value | Nutritional status | x2 | P value |
| Wasting | Over weight | Stunting |
| Cerebral palsy (CP) | 26 (34.7%) | 02 (11.8%) | 38.052 | 0.001 | 29 (32.2%) | 25.533 | 0.001 |
| Cerebral palsy with Epilepsy | 24 (32%) | 02 (11.8%) | 28 (31.1%) |
| Epilepsy | 06 (8%) | 0 | 06 (6.7%) |
| Down syndrome | 02 (2.7%) | 02 (11.8%) | 09 (10%) |
| Autism Spectrum Disorder  (ASD) | 04 (5.3%) | 04 (23.5%) | 06 (6.7%) |
| ADHD | 01 (1.3%) | 03 (17.6%) | 0 |
| Speech delay | 08 (10.7%) | 01 (5.9%) | 05 (5.6%) |
| Developmental Delay | 02 (2.7%) | 02 (11.8%) | 05 (5.6%) |
| Intellectual Disability | 02 (2.7%) | 01 (5.9%) | 02 (2.2%) |
| Total | 75 (100%) | 17 (100%) | 90 (100%) |

**Table 4: Association between nutritional status and socio-demographic status of children with NDDs (n=157)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Education level | Variables | Father | | X2 | P value | Mother | | X2 | P value |
| Nutritional status | | Nutritional status | |
| Wasting | Over weight | Wasting | Over weight |
| No formal education | 18  (24%) | 2 (11.8%) | 24.24 | 0.019 | 06 (8%) | 01  (5.9%) | 29.81 | 0.003 |
| Up to primary | 15  (20%) | 02 (11.8%) | 14 (18.7%) | 0 |
| Below SSC | 15  (20%) | 0 | 28 (37.3%) | 04 (23.5%) |
| SSC | 15  (20%) | 02 (11.8%) | 21 (28%) | 03 (17.6%) |
| HSC | 03 (4%) | 02 (11.8%) | 03 (4%) | 03 (17.6%) |
| Bachelors | 05  (6.7%) | 04 (23.5%) | 01 (1.3%) | 02 (11.8%) |
| Masters and above | 04  (5.3%) | 05 (29.4%) | 02 (2.7%) | 04 (23.5%) |
| Total | 75  (100%) | 17 (100%) | 75 (100%) | 17 (100%) |
| Occupation | Govt. Service | 01  (1.3%) | 0 | 23.77 | 0.022 | 01 (1.3%) | 0 | 15.43 | 0.117 |
| Other Service | 04  (5.3%) | 06 (35.3%) | 02 (2.7%) | 02(11.8%) |
| Business | 27  (36%) | 07 (41.2%) | 01 (1.3%) | 0 |
| Day labor | 09  (12%) | 01 (5.9%) | 01 (1.3%) | 0 |
| Farmer | 16  (21.3%) | 02  (11.8%) | - | - |
| Housewife | - | - | 65 (86.7%) | 15(88.2%) |
| Unemployed | 01  (1.3%) | 0 | - | - |
| Others | 17  (22.7%) | 01(5.1%) | 5 (6.7%) | 0 |
| Total | 75  (100%) | 17  (100%) | 75 (100%) | 17(100%) |
|  |  | Nutritional status | | | | | |  |  |
| Wasting | | Over weight | | | |
| Residence | Urban | 11 (14.7%) | | 07 (41.2%) | | | | 8.71 | .042 |
| Semi-urban | 06 (8%) | | 0 | | | |
| Rural | 58 (77.3%) | | 10 (58.8%) | | | |
| Total | 75 (100%) | | 17 (100%) | | | |
| Family income  (BDT) | ≤10000 | 41 (54.7%) | | 03 (17.6%) | | | | 27.34 | 0.000 |
| 11000-25000 | 23 (30.7%) | | 02 (11.8%) | | | |
| 26000-35000 | 02 (2.7%) | | 06 (35.3%) | | | |
| ≥35000 | 09 (12%) | | 06 (35.3%) | | | |
| Total | 75 (100%) | | 17 (100%) | | | |
| Family type | Nuclear | 57 (76%) | | 09 (52.9%) | | | | 4.03 | 0.133 |
| Extended | 18 (24%) | | 08 (47.1%) | | | |
| Household size | Small Family  1-3 Members | 12 (16%) | | 03 (17.6%) | | | | 3.77 | 0.438 |
| Medium Family  4-5 Members | 41 (54.7%) | | 06 (35.3%) | | | |
| Large Family  ≥6 Members | 22 (29.3%) | | 08 (47.1%) | | | |
| Total | 75 (100%) | | 17 (100%) | | | |

**Table 5: Factors associated with malnutrition among the 6 to 144-month-olds NDD children (Binary logistic regression analysis)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Characteristics | Unadjusted OR (95% CI) | p-values | Adjusted OR\* (95% CI) | p-values |
| Age (month) |  |  |  |  |
| <24 (ref) | 1 |  |  |  |
| 25-48 | 3.15 (1.22-8.14) | 0.018\* | 4.70 (1.55-14.27) | 0.006\* |
| 49-72 | 2.97 (1.03-8.54) | 0.043\* | 4.74 (1.37-16.32) | 0.014\* |
| 73-96 | 4.81 (1.25-18.50) | 0.022\* | 5.61 (1.29-24.29) | 0.021\* |
| 97-120 | 2.33 (0.65-8.34) | 0.192 | 4.65 (0.99-21.66) | 0.050\* |
| >121 | 3.30 (1.13-9.69) | 0.029\* | 4.20 (1.26-13.97) | 0.019\* |
| Father education |  |  |  |  |
| Masters and above (ref) | 1 |  |  |  |
| Bachelors | 1.71 (0.46-6.37) | 0.421 | 2.00 (0.42-9.50) | 0.383 |
| HSC | 1.11 (0.25- 4.82) | 0.888 | 0.61 (0.09-4.18) | 0.620 |
| SSC | 4.53 (1.21- 16.96) | 0.025\* | 3.32 (0.51-21.64) | 0.210 |
| Below SSC | 1.33 (0.43- 4.09) | 0.615 | 0.73 (0.13-3.97) | 0.713 |
| Up to Primary | 2.52 (0.77- 8.22) | 0.126 | 1.26 (0.20-7.92) | 0.802 |
| No formal Education | 2.42 (0.78- 7.54) | 0.126 | 1.53 (0.26-8.95) | 0.637 |
| Father occupation |  |  |  |  |
| Service (ref) | 1 |  |  |  |
| Business | 2.91 (1.11- 7.62) | 0.030\* | 2.34 (0.67-8.12) | 0.181 |
| Day labor | 2.01 (0.77- 5.20) | 0.151 | 0.91 (0.19-4.37) | 0.910 |
| Others | 2.38 (0.81-6.96) | 0.113 | 1.18 (0.25-5.57) | 0.834 |
| Household Income |  |  |  |  |
| >35000 Taka (ref) | 1 |  |  |  |
| 26000-35000 Taka | 0.87 (0.25- 2.96) | 0.819 | 0.72 (0.16-3.27) | 0.716 |
| 11000-25000 Taka | 1.03 (0.40- 2.65) | 0.948 | 0.63 (0.13-3.07) | 0.570 |
| 100-10000Taka  (1-101USD) | 1.66 (0.67- 4.07) | 0.269 | 0.90 (0.16-5.12) | 0.910 |
| Place of residence |  |  |  |  |
| Urban (ref) | 1 |  |  |  |
| Semi-urban | 1.05 (0.29- 3.88) | 0.93 | 0.63 (0.12-3.30) | 0.584 |
| Rural | 1.79 (0.84- 3.81) | 0.13 | 1.60 (0.46-5.52) | 0.455 |
| Clinical diagnosis |  |  |  |  |
| Autism Spectrum Disorders (ref) | 1 |  |  |  |
| Down Syndrome | 0.54 (0.14- 2.15) | 0.385 | 0.61 (0.12-3.09) | 0.555 |
| Cerebral Palsy | 1.68 (0.81- 3.48) | 0.164 | 2.39 (0.83-6.87) | 0.106 |

\*Sig (p<0.05)