

## List of Tables

Table	Page No.
Table 2.1 Daily Nutrient Requirements for Adolescents- India	16
Table 2.2 Prevalence of Undernutrition among School going Children and Adolescents- Studies across the Globe	21
Table 2.3 Prevalence of Undernutrition among School going Children and Adolescents- Studies across India	24
Table 2.4 Prevalence of Undernutrition among School going Children and Adolescents- Departmental Studies	28
Table 2.5 Studies on the Impact of Mid Day Meal on various Parameters	44
Table 2.6 Gaps and Limitations in MDMP reported in Studies	46
Table 2.7 Impact of Mid Day Meal with NGO intervention	49
Table 2.8 Departmental Studies on Impact of NHE	57
Table 3.1 NHE Strategy	69
Table 3.2 Anemia Classification (Hb, g/dl)	73
Table 3.3 Various Methods and Tools Used in Data Collection	88
Table 4.1 Infrastructure Facilitates at the Schools Selected in the Study (N=6)	91
Table 4.2 Number of Subjects in Selected Schools (anthropometry)	93
Table 4.3 Distribution of Children Cross-Tabulated by Age & Gender	95
Table 4.4 Mean Weight (Kg) of the Children Cross Tabulated by Age & Gender	96
Table 4.5 Genderwise Mean Weight (Kg) of the Children across the Stages of Adolescence	97
Table 4.6 Mean Height (cm) of the Children Cross Tabulated by Age & Gender	98
Table 4.7 Genderwise Mean Height (cm) of the Children across the Stages of Adolescence	99
Table 4.8 Mean BMI (Kg/m <sup>2</sup> ) of the Children Cross Tabulated by Age & Gender	101
Table 4.9 Genderwise Mean BMI (Kg/m <sup>2</sup> ) of the Children across the Stages of Adolescence	102
Table 4.10 Genderwise Mean Anthropometric Indices	103
Table 4.11 Mean WAZ of the Children Cross Tabulated by Age & Gender	103

Table 4.12 Genderwise Prevalence of Underweight among Children (<10 years of age) (n, %)	104
Table 4.13 Mean HAZ of the Children Cross-Tabulated by Age & Gender	106
Table 4.14 Genderwise Mean HAZ of the Children across the Stages of Adolescence	106
Table 4.15 Genderwise Prevalence of Stunting among Children (n, %)	107
Table 4.16 Prevalence of Stunting among Children across Age Groups (n, %)	107
Table 4.17 Prevalence of Stunting among Children across the Stages of Adolescence (n, %)	108
Table 4.18 Mean BAZ of the Children Cross Tabulated by Age & Gender	109
Table 4.19 Genderwise Mean BAZ of the Children across the Stages of Adolescence	110
Table 4.20 Genderwise Prevalence of Thinness, Overweight and Obesity among Children (n, %)	110
Table 4.21 Prevalence of Thinness, Overweight and Obesity among Children Across age groups (n, %)	111
Table 4.22 Prevalence of Thinness, Overweight and Obesity among Children across the Stages of Adolescence (n, %)	113
Table 4.23 Socio Demographic Background of the Subjects	114
Table 4.24 Education of Parents of the Subjects	115
Table 4.25 Occupation of Parents of the Subjects	116
Table 4.26 Monthly Family Income of the Enrolled Children	118
Table 4.27 Reported Frequency of Consumption of MDM among Children	119
Table 4.28 Reasons for not consuming MDM at school	120
Table 4.29 Preference for MDM among Children	120
Table 4.30 Food Items Served under MDM liked the Most by Children	121
Table 4.31 Food Items served Under MDM disliked by Children	122
Table 4.32 Perceptions about benefits of Mid Day Meal	124
Table 4.33 Practices and Perceptions Related to Handwashing	125
Table 4.34 Reported use of soap for handwashing	127
Table 4.35 Perceived reasons for keeping nail trimmed and clean	127
Table 4.36 Practices Related to Nail Hygiene among Children	128
Table 4.37 Practices and Perceptions related to Bathing among Children	129

Table 4.38 Mean Anthropometric Measurements of Subjects Selected in the Sub-sample	131
Table 4.39 Mean Daily Dietary Intake among Children	132
Table 4.40 Gender-wise Percent RDA (2010) met by daily diet	134
Table 4.41 Gender-wise Percent EAR (2020) met by daily diet	134
Table 4.42 Gender-wise Percent Nutrient Requirements Met by Daily Diets: RDA (2010) Vs EAR (2020)	135
Table 4.43 Nutrient Adequacy of Daily Diets of Children	137
Table 4.44 Gender-wise Mean AMDR as Percent Energy	138
Table 4.45 Percent of Children consuming Diets Meeting AMDR	138
Table 4.46 Mean Daily Nutrient Intake through MDM	139
Table 4.47 Mean Nutrient Intake through Mid Day Meal Breakfast	139
Table 4.48 Mean Daily Nutrient Intake through Mid Day Meal Lunch	140
Table 4.49 Mean Percent Contribution of MDM to the Daily Nutrient Intake	142
Table 4.50 Gender-wise Percent RDA (2010) met by MDM	142
Table 4.51 Gender-wise Percent EAR (2020) met by MDM	143
Table 4.52 Water, Sanitation and Hygiene	145
Table 4.53 Observations related to sitting arrangement for MDM	147
Table 4.54 Observation related to serving of MDM	148
Table 4.55 Role of Teachers in execution of MDM at schools	150
Table 4.56 Management of leftover foods	152
Table 4.57 Electronic Machines used in Centralised Kitchen of The Akshay Patra Foundation for Pre-preparation of Meals	154
Table 4.58 Electronic Machines used in Centralised Kitchen of The Akshay Patra Foundation for Cooking Meals	154
Table 4.59 Availability of Basic Supplies (N=6)	188
Table 4.60 Cleanliness of kitchen and storage (N=6)	189
Table 4.61 Observations of Storage (N=6)	189
Table 4.62 Personal Hygiene of Staff Members	190
Table 4.63 Cleaning of Kitchen Area	192
Table 4.64 Cleaning of Utensils	192
Table 4.65 Food Handling at the Centralised Kitchen	193
Table 4.66 Dispatch of Food	194
Table 4.67 Weekly Menu of MDM Provided by Centralised Kitchen	196

Table 4.68 Nutrient Composition of Food Items Prepared at the Centralised Kitchen- Lunch	197
Table 4.69 Nutrient Composition of Food Items Prepared at the Centralised Kitchen- Breakfast	198
Table 4.70 Microbial Profile of Thepla at the time of Production and Serving	201
Table 4.71 Microbial Profile of Roti at the time of Production and Serving	201
Table 4.72 Microbial Profile of Dal Dhokali at the time of Production and Serving	202
Table 4.73 Microbial Profile of Mix Dal at the time of Production and Serving	202
Table 4.74 Microbial Profile of Chana Dal at the time of Production and Serving	203
Table 4.75 Microbial Profile of Aloo Subji at the time of Production and Serving	203
Table 4.76 Microbial Profile of Mix Subji at the time of Production and Serving	204
Table 4.77 Microbial Profile of Jeera Rice at the time of Production and Serving	204
Table 4.78 Microbial Profile of Chana Rice at the time of Production and Serving	205
Table 4.79 Microbial Profile of Khichadi at the time of Production and Serving	205
Table 4.80 Microbial Profile of Vegetable Pulao at the time of Production and Serving	206
Table 4.81 Microbial Profile of Peas Pulao at the time of Production and Serving	206
Table 4.82 Lists of Schools Selected from Rural Industrial area of Vadodara (Phase Two)	208
Table 4.83 Infrastructure and Facilities at the Schools Selected in Phase 2 of the study	209
Table 4.84 Genderwise mean anthropometric measurements (N=933) (Screening)	210
Table 4.85 Mean anthropometric measurements across the schools (N=933) (Screening)	210
Table 4.86 Gender wise Mean anthropometric indices (Screening)	211

Table 4.87 Gender wise Prevalence of Underweight among Children <10 years of Age (Screening)	213
Table 4.88 School wise Prevalence of Underweight among Children <10 years of Age (N= 151) (Screening)	213
Table 4.89 Gender wise Prevalence of Stunting among Children (Screening)	214
Table 4.90 School wise Prevalence of Stunting among Children (N=933) (Screening)	214
Table 4.91 Gender wise Prevalence of Thinness, Overweight and Obesity among Children (Screening)	215
Table 4.92 School wise Prevalence of Thinness, Overweight and Obesity among Children (N=933) (Screening)	215
Table 4.93 Population Covered for Data Collection	216
Table 4.94 Mean Weight (Kg) of the Moderate and Severely Thin Children Cross Tabulated by Age and Sex	217
Table 4.95 Mean Height (cm) of the Moderate and Severely Thin Children Cross Tabulated by Age and Sex	218
Table 4.96 Mean BMI (Kg/m <sup>2</sup> ) of the Moderate and Severely Undernourished Children Cross Tabulated by Age and Sex	219
Table 4.97 Prevalence of Underweight in Moderate and Severely Thin Children (<10 Years of age) (N=42)	220
Table 4.98 Prevalence of Stunting in Moderate and Severely Thin Children (N=310)	222
Table 4.99 Socio Demographic Background of Thin Children across the Study Groups	223
Table 4.100 Education of Parents of Thin Children across the Study Groups	224
Table 4.101 Occupation of Parents of Thin Children across the Study Groups	225
Table 4.102 Family Income of Thin Children across the Study Groups	228
Table 4.103 Genderwise Hemoglobin Levels (g/dl) and Prevalence of Anemia among Thin Children	229
Table 4.104 Genderwise Mean Nutrient Intake among Thin Children	231
Table 4.105 Genderwise Mean Recommended Allowances through Dietary Intakes among Thin Children	231

Table 4.106 Shifts in Mean anthropometric Measurements post Intervention	233
Table 4.107 Mean Anthropometric Indices Before and After Intervention	233
Table 4.108 Underweight Before and After Intervention among Subjects (<10 years)	234
Table 4.109 Stunting among Subjects Before and After Intervention	236
Table 4.110 Shift in Thinness among Subject Post Intervention	237
Table 4.111 Impact of NHE on Mid Day Meal Consumption Pattern of Thin Children (N=275)	238
Table 4.112 Impact of NHE on Preference for Mid Day Meal among Thin Children	239
Table 4.113 Impact of NHE on Perceptions on Benefits of Mid Day Meal among Thin Children	239
Table 4.114 Perceived Benefits of MDM among Children- Pre and Post Intervention Comparison	241
Table 4.115 Reasons for not considering MDM as beneficial- Pre and Post Intervention Comparison	242
Table 4.116 Practices and Perception regarding Hand-washing- Pre and Post Intervention Comparison	243
Table 4.117 Impact of NHE on Usage of Soap for Hand-washing among Thin Children	245
Table 4.118 Perceptions of Children Regarding Nail Hygiene- Pre and Post Intervention	246
Table 4.119 Practices Related to Nail Hygiene among Children- Pre and Post Intervention	247
Table 4.120 Perception regarding Bathing as a Hygiene Practice - Pre and Post Intervention Comparison	248
Table 4.121 Observations Related to MDM Implementation at School Level Before and After Intervention	250
Table 4.122 Observations Related to Water, Sanitation and Hygiene at School Level Before and After Intervention	251
Table 4.123 Morbidity Profile of Thin Children- Pre and Post intervention	253
Table 4.124 Impact of NHE on Cognition Scores in Thin Children	254
Table 4.125 Impact of NHE on Physical Work Capacity among Thin Children	256

Table 4.126 Impact of NHE on Hemoglobin Levels (mg/dl) and Anemia among Thin Children	257
Table 4.127 Impact of NHE on Mean Nutrient Intake among Subjects	258
Table 4.128 Impact of NHE on Dietary Adequacy among Thin Children	260
Table 4.129 Washout Effect on Mean Anthropometric Measurements of thin children	261
Table 4.130 Washout Effect on Mean Anthropometric Indices of Thin Children	263
Table 4.131 Washout effect on Underweight among Children	264
Table 4.132 Washout effect on Stunting among Children	265
Table 4.133 Washout effect on Thinness among Children	266
Table 4.134 Washout Effect on Frequency of MDM Consumption	269
Table 4.135 Preference for Mid Day Meal among Thin Children after Washout	270
Table 4.136 Reasons for Not Consuming MDM after Washout	271
Table 4.137 Perceptions on Benefits of Mid Day Meal among Thin Children- Comparison between baseline, post intervention and washout data	272
Table 4.138 Perceived Benefits of MDM among Thin Children- Pre, Post Intervention and Washout Comparison	273
Table 4.139 Perceptions Regarding Hand-washing: Pre, Post Intervention and Washout Comparison	274
Table 4.140 Hand-washing Practices among Thin Children- Pre, Post and Washout Comparison	276
Table 4.141 Impact of NHE on Usage of Soap and Washout Effect	277
Table 4.142 Perception regarding Nail Hygiene- Baseline, Post Intervention and Washout Comparison	278
Table 4.143 Practices regarding Nail Hygiene- Baseline, Post Intervention and Washout Comparison	279
Table 4.144 Morbidity Profile of Thin Children- Comparison between Baseline, Post Intervention and Washout Data	280
Table 4.145 Washout effect on Physical Work Capacity among Children	282
Table 4.146 Washout Effect on Cognitive Scores among Thin Children	282
Table 5.1 Limits of Aerobic Plate Count/Standard Plate Count, Coliforms and E. Coli in Ready to Eat Foods as per Various Guidelines (cfu/gm)	289
Table 6.1 Summary of the Impact of NHE Intervention (Post Intervention)	308