Household Food-Related Social Transfers and Self-Reported Life Satisfaction among Adolescent Girls Aged 15–17 in Bangladesh

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A thesis submitted for the degree of Master of Science (by Dissertation) in Public Health

School of Health and Social Care

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Date of submission for examination: January 2026

Declaration

I declare that this dissertation, entitled "Household Food-Related Social Transfers and Self-Reported Life Satisfaction among Adolescent Girls Aged 15–17 in Bangladesh'' is my own original work and has not been submitted for any other degree or qualification at this or any other university. All sources of information have been appropriately acknowledged and referenced.

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Acknowledgement

I would like to express my sincere gratitude to my supervisor for her valuable guidance, patience, support, and continuous encouragement throughout the completion of this thesis. I am also deeply thankful to my family for their understanding, support, and motivation during this challenging period, which made the successful completion of this work possible.

Table of Contents

Declaration 2

Acknowledgement 3

List of Tables 10

List of Figures 12

Abstract 13

1 Introduction 13

1.1 Introduction to Life Satisfaction 15

1.2 Background Context: Bangladesh 17

1.3 Relationship Between Food, Food-Related Social Transfers, and Life Satisfaction 20

1.4 Theoretical Foundation: Social Determinants of Health (SDH) 22

1.5 Rationale for the Study 24

1.6 Problem Statement 27

1.7 Research Questions 28

1.8 Research Objectives 28

1.9 Significance of the Study 28

1.10 Scope and Delimitations 30

1.11 Structure of the Thesis 33

2 Systematic Literature Review 36

2.1 Introduction to the Review 36

2.2 Review Type and Synthesis Plan 37

2.3 PEO Framework (Population–Exposure–Outcome) 38

2.4 Eligibility Criteria 39

2.5 Search Strategy 42

2.6 Information Sources 44

2.7 Study Selection Process 45

2.8 Data Extraction 46

2.9 Quality Appraisal (risk of bias) 47

2.10 Narrative Synthesis Plan 50

2.11 Narrative Synthesis of the Literature 51

2.12 Overview of Included Studies 52

2.13 Thematic Synthesis of the Literature 53

2.13.1 Food-Related Social Transfers and Child and Adolescent Well-Being 53

2.13.2 Limited Evidence on Gendered Dimensions of Well-Being 54

2.13.3 Food Insecurity, Nutrition, and Psychosocial Well-Being 55

2.13.4 Social Transfers and Subjective Well-Being concerning Food 56

2.13.5 Evidence Gaps in the Bangladeshi Situation 57

2.13.6 Synthesis Using the Social Determinants of Health Framework 58

2.14 PRISMA Flow Diagram 59

3 Research Methodology 61

3.1 Data Source and Study Design 61

3.1.1 Justification for Use of Secondary Data 62

3.1.2 Research Design and Analytical Approach 63

3.2 Ethical Considerations 65

3.3 Study Population and Sample Selection 67

3.4 Variables Definition and Preparation 68

3.4.1 Dependent Variable 68

3.4.2 Exposure and Covariates 69

3.5 Measurement Validity and Reliability 71

3.6 Statistical Analysis 73

3.6.1 Missing Data Assessment 73

3.7 Definition of Study Variables and Analytical Roles 74

3.7.1 Descriptive Analysis 75

3.7.2 Linear Regression Analysis 76

3.7.3 Binary Regression Analysis 76

3.7.4 Regression Analysis for Food Transfer Recipients Only 76

3.7.5 Sensitivity Analysis 77

3.7.6 Chi-square Tests/ Crosstabs 77

3.7.7 Interaction Effects 77

4 Results 80

4.1 Sample Characteristics (Research Questions 1 and 2) 80

4.2 MCAR Test Results for Mother's Education 84

4.3 Bivariate Association between Household Food-Related Social Transfers and Life Satisfaction (Research Question 3) 86

4.4 Regression Analysis (Research Question 3) 90

4.4.1 Regression Analysis: Continuous Life Satisfaction and Food Transfer Receipt . 90

4.4.2 Regression Analysis – Binary Life Satisfaction with Food Transfer Receipt 93

4.4.3 Regression Analysis - Continuous Life Satisfaction with Timing of food transfer received. 96

4.4.4 Regression Analysis – Binary Life Satisfaction with Timing of Food Transfer Received 99

4.5 Sensitivity Analysis (Research Question 3 – Robustness Check) 102

4.5.1 Regression Analysis - Continuous Life Satisfaction with Food Transfer Receipt 103

4.5.2 Regression Analysis – Binary Life Satisfaction with Food Transfer Receipt ... 105

4.5.3 Regression Analysis - Continuous Life Satisfaction with Timing of food transfer received. 108

4.5.4 Regression Analysis – Binary Life Satisfaction with Timing of Food Transfer Received 110

4.6 Comparison of characteristics of Food and non-food receipt households (Research Question 2) 113

4.7 Mean Life Satisfaction with Food Transfer Receipt 114

4.8 Interaction Effects Between Food Transfer Receipt and Socio-Demographic Factors (Research Question 3 – Subgroup Analysis) 115

4.9 Chapter Summary 116

5 Discussion 118

5.1 Introduction to Chapter 118

5.2 Summary of Key Findings 119

5.3 Discussion of Findings in Relation to Literature 122

5.3.1 Association Between Food-Related Social Transfers and Life Satisfaction 123

5.3.2 Sociodemographic Determinants of Life Satisfaction 126

5.4 Interaction Effects 133

5.5 Comparison with Previous Literature 135

5.6 Strengths of the Study 138

5.7 Limitations of the Study 140

5.8 Policy and Programmatic Implications 141

5.9 Contribution to Knowledge 143

6 Conclusion and Recommendations 148

6.1 Overall Conclusion of the Study 148

6.2 Key Conclusions of the Study 148

6.3 Policy Recommendations 149

6.3.1 Strengthening Food-Related Social Protection Programmes 149

6.3.2 Targeting Vulnerable Groups 151

6.4 Recommendations for Future Research 153

6.5 Final Remarks 157

References 158

Appendix 171

Appendix Table 1: Quality Appraisal of Included Studies 171

Appendix Table 2: JBI Critical Appraisal of Included Cross-Sectional Studies 173

Appendix Table 3: JBI Critical Appraisal of the Qualitative Study 174

Appendix Table 4: Interaction Effects between Household Food Transfer Receipt and Socio-Demographic Factors on Binary Life Satisfaction (Complex Samples Logistic Regression, Cross-Referenced from Section 4.8) 175

List of Tables

Table 1: Selected Macro-Level Indicators of Gender Disparity in Bangladesh (Bangladesh MICS 2019) 17

Table 2: Eligibility Criteria for Study Selection (PEO Framework) 39

Table 3: Definition of Study Variables and Analytical Roles 74

Table 4: Socio-Demographic Characteristics of Adolescent Girls Aged 15–17 Years, Bangladesh MICS 2019 (Weighted) 81

Table 5: Socio-Demographic Characteristics of Adolescent Girls Aged 15–17 Years, Bangladesh MICS 2019 (Unweighted) 82

Table 6: Logistic Regression Results for the MCAR Test of Mother's Education 84

Table 7: Omnibus Tests of Model Coefficients 86

Table 8: Bivariate Association between Household Food-Related Social Transfers and Life Satisfaction 86

Table 9: Regression Results Predicting Continuous Life Satisfaction 91

Table 10: Binary Logistic Regression Results Predicting High Life Satisfaction 94

Table 11: Complex Samples General Linear Model Results Predicting Continuous Life Satisfaction with Timing of Food Transfer Receipt 98

Table 12: Complex Samples Logistic Regression Results Predicting High Life Satisfaction with Timing of Food Transfer Receipt 101

Table 13: Complex Samples General Linear Model Results Predicting Continuous Life Satisfaction with Food Transfer Receipt 104

Table 14: Complex Samples Logistic Regression Results Predicting High Life Satisfaction with Food Transfer Receipt 106

Table 15: Complex Samples General Linear Model Results Predicting Continuous Life Satisfaction with Timing of Food Transfer Receipt 109

Table 16: Complex Samples Logistic Regression Results Predicting High Life Satisfaction with Timing of Food Transfer Receipt 111

Table 17: Socio-Demographic Characteristics of Adolescents by Household Food Transfer Receipt 113

Table 18: Mean Life Satisfaction by Food Transfer Receipt Status 115

List of Figures

Figure 1: PRISMA Diagram 60

Figure 2: Distribution of Life Satisfaction (0–10 Ladder Step) with Imposed Normal Curve, Weighted (n = 6,666; Mean = 6.11, SD = 2.38), Bangladesh MICS 2019 84

Figure 3: Distribution of life satisfaction by household food-related social transfer receipt .. 89

Abstract

The subjective well-being of adolescent girls is an important concern in public health and social science research worldwide. Food-related social protection programmes are primarily aimed at addressing household food insecurity, and while these interventions have been widely studied, evidence on their impact on adolescent well-being remains limited. This study examines the association between household receipt of food-related social transfers and self-reported life satisfaction among adolescent girls aged 15-17 years in Bangladesh, adjusting for key socio-demographic characteristics, guided by the Social Determinants of Health (SDH) framework.

This research utilised the nationally representative secondary data from the Bangladesh Multiple Indicator Cluster Survey (MICS) 2019, with a final sample of 6,678 adolescent girls. Life satisfaction was measured using the Cantril Ladder scale (0–10) and analysed as both a continuous and a binary variable. Two primary exposure variables were defined as household receipt of food-related social transfers and the timing of receipt. Analysis was performed using descriptive statistics, complex-sample linear regression, and logistic regression, incorporating the stratified cluster design and sampling weights from the survey. Sensitivity analyses, subgroup comparisons, and interaction effects were conducted to determine the strength of the findings.

Study findings indicate that adolescent girls had a moderate level of life satisfaction, with a mean score of 6.1 (SD = 2.38, SE = 0.036, 95% CI: 6.03–6.16). Overall, 13.1% of households received food-related social transfers, and 54.4% of adolescent girls reported high life satisfaction (Cantril Ladder score of 6–10). Life satisfaction among girls in households receiving food-related social transfers was not statistically significant in either regression analysis (continuous model: B = 0.175, 95% CI: -0.023 to 0.373, p = 0.083; binary model: OR = 1.062, 95% CI: 0.889–1.268, p = 0.506), including those that considered the timing of receipt.

As this study was cross-sectional, these findings indicate no significant association between household food-related social transfers and the self-reported life satisfaction of adolescent girls, rather than evidence that food transfers reduce or improve life satisfaction. Rather, the factors that affect the issue are more structural and socio-economic in nature. This study emphasises that complex social protection mechanisms must be implemented to enhance the well-being of adolescents in Bangladesh through the effective integration of food, education, economic support, and psychosocial support.

Key Words: Adolescent girls; Life satisfaction; Subjective well-being; Food-related social transfers; Social protection; Bangladesh; Social Determinants of Health

1 Introduction

1.1 Introduction to Life Satisfaction

Life satisfaction is a crucial aspect of subjective well-being, indicating how a person evaluates their overall life experience. It is commonly used in public health and social science research to understand people's quality of life. Although life satisfaction is often measured with a simple question, it offers a broader and more stable understanding of a person's values, expectations, and life experiences (Shangani et al., 2017). It is not only about physical health or economic conditions, but it also reflects mental, emotional, and social well-being.

People with low life satisfaction are more likely to experience anxiety, depression, and poor mental health outcomes. In contrast, people with higher life satisfaction often exhibit positive mental health, have good energy, stronger social relationships, and achieve better outcomes in their lives (Ekinci, 2024). Life satisfaction is also connected to physical health, including healthy sleep, healthy behaviours, and fewer stress-related physical symptoms (A. U. Ahmed et al., 2024). For these reasons, life satisfaction is a crucial measure for understanding population well-being and enhancing the overall quality of life.

Adolescence is a crucial period in life because many physical, emotional, and social changes happen during this time. Young people aged 15–17 undergo significant hormonal changes that may be associated with changes in their physical and mental well-being(Cluver et al., 2016). These changes can sometimes create difficulties in balancing school, family, and social life. Among adolescents, girls are especially important because they often face more challenges than boys.

In many countries, especially in South Asia, girls experience gender norms that can limit their opportunities, independence, and decision-making power. They may also have more household responsibilities and face pressure related to marriage and motherhood. Girls typically spend more time in the household environment than boys, so when there is stress or instability in the home, girls can be more emotionally affected(Glass et al., 2020). Their well-being is also important because these girls will become mothers, and a mother's health and education directly affect her children and family.

Understanding life satisfaction among adolescent girls is important for public health and community development. Girls with low life satisfaction may face emotional problems later in life, including anxiety and depression, and they may have lower school performance and reduced motivation (Jamaluddine & Sieverding, 2022). On the other hand, girls with high life satisfaction often achieve better educational outcomes, more favourable job opportunities, healthier family lives, and stronger social connections as adults (Lyubomirsky et al., 2005).

Life satisfaction in adolescents is influenced by various factors, including family income, food security, family support, social relationships, and educational opportunities. When adolescent girls experience good well-being, they grow into healthier adults and contribute to building stronger families in the future (Shenk et al., 2021). These influences go in both directions. Therefore, studying life satisfaction among adolescent girls in Bangladesh can help us understand how their well-being is related to food-related social protection programmes and other socio-demographic factors such as household education, wealth, and family roles.

1.2 Background Context: Bangladesh

Bangladesh is one of the South Asian countries and has been classified as a lower–middle–income country since 2015. The socio-economic situation in Bangladesh has been evolving gradually since its independence, but the country continues to struggle with inequality and poverty. Many families continue to face challenges, including economic burdens, limited social spending, high inflation, fewer job opportunities, and restricted access to basic facilities(Harris-Fry et al., 2017). These issues significantly affect the day-to-day lives of people living in the country, particularly young children and adolescents who rely on their households for support and well-being.

Adolescents play an important role in the future development of Bangladesh. They are the group that will contribute to the country's economic growth and social progress in the next generation. Among them, adolescent girls face some of the most challenging situations during this stage of life(S. S. Ahmed, 2007). While many girls continue their education up to higher levels, many others are forced to leave school due to family responsibilities, financial difficulties at home, or early marriage. Since most household heads are men, early marriage often limits girls' social environments, educational achievements, and personal freedom. As a result, many adolescent girls struggle with lower levels of subjective well-being (Chakarvarti, 2022).

Table 1 presents selected macro-level indicators comparing boys and girls in Bangladesh across education, mortality, child marriage, and adolescent reproductive health. These indicators illustrate the multidimensional nature of gender disparities and provide important context for focusing on adolescent girls in this study.

Table 1: Selected Macro-Level Indicators of Gender Disparity in Bangladesh (Bangladesh MICS 2019)

Indicator	Boys/Male	Girls/Female	Measurement
Lower-secondary school attendance rate	51.2%	64.6%	Percentage of children of lower-secondary-school age attending lower-secondary education or a higher level
Lower-secondary out-of-school rate	18.2%	8.0%	Percentage of children of lower-secondary-school age not attending primary, secondary or higher education
Upper-secondary school attendance rate	43.1%	53.4%	Percentage of young people of upper-secondary-school age attending upper-secondary education or a higher level
Upper-secondary out-of-school rate	36.5%	26.1%	Percentage of young people of upper-secondary-school age not attending primary, secondary or higher education
Neonatal mortality rate	29	23	Deaths during the first 28 days of life per 1,000 live births
Infant mortality rate	37	30	Deaths before the first birthday per 1,000 live births
Under-five mortality rate	43	36	Deaths before age five per 1,000 live births
Married before age 18	Not available	51.4%	Percentage of women aged 20–24 who were first married before age 18
Adolescent birth rate	Not applicable	83	Live births per 1,000 women aged 15–19

Note. “Not available” indicates that the Bangladesh MICS 2019 report did not provide a directly comparable estimate for boys. “Not applicable” indicates that the indicator is biologically specific to females. **Source:** Bangladesh Bureau of Statistics (BBS) & UNICEF Bangladesh. Bangladesh Multiple Indicator Cluster Survey (MICS) 2019.

As shown in Table 1, although girls perform better than boys on several education and child survival indicators, they continue to experience substantial disadvantages related to child marriage and adolescent childbearing. These contrasting patterns demonstrate that gender inequality in Bangladesh is complex and reinforce the importance of examining adolescent girls' well-being.

Food insecurity is another major challenge in Bangladesh, especially in rural areas (Sraboni et al., 2014). Although Bangladesh has a strong agricultural sector and produces healthy and nutritious foods throughout the year, not all families can access enough food to meet their daily needs (Uthso & Akter, 2022). Poor and extremely poor households, particularly in rural areas, face difficulties in purchasing or accessing high-quality food. Sometimes, families lack steady employment or a sufficient income to meet their basic needs, such as food and shelter. When a household lacks sufficient food, it creates stress, discomfort, and feelings of insecurity within the home (Koly et al., 2023). These conditions can affect all family members, especially adolescents, because they need good nutrition during this period of rapid physical and mental growth.

To support vulnerable families struggling with basic needs, the Government of Bangladesh has introduced several public services and social protection programmes. These programmes aim to reduce hunger, improve nutrition, and support the well-being of poor households (Hamvai et al., 2023). Major programmes include the Vulnerable Group Development (VGD) programme, the Vulnerable Group Feeding (VGF) programme, the Food-Friendly Programme, and numerous non-governmental and charitable initiatives that provide food support to impoverished women and families. These programmes also help people during emergencies and natural disasters. Most of these interventions target vulnerable women and children to ensure they have some level of protection in difficult times(Shenk et al., 2021).

Bangladesh is a crucial country for studying the subjective well-being of adolescent girls, as their daily lives are deeply intertwined with economic issues, gender norms, cultural traditions, and family structures(Gulema et al., 2024). Understanding the relationship between food-support programmes and the well-being of adolescent girls can help develop better social and public health interventions in the future. At the same time, improving adolescent well-being

supports Bangladesh's long-term goal of becoming an upper–middle–income country by 2031, because healthy and empowered adolescents will lead to stronger families and a stronger nation.

1.3 Relationship Between Food, Food-Related Social Transfers, and Life Satisfaction

Access to sufficient food is one of the most basic needs for every family in the world. When a household has enough food for its daily needs, it creates a feeling of stability, safety, and comfort. A well-fed family is more likely to live in a happy and healthy environment. However, when a family faces any kind of food insecurity- such as not having enough food, worrying about running out of food, eating low-quality or less nutritious meals, or reducing meal sizes- these experiences can affect the well-being of the whole family. (A. U. Ahmed et al., 2024)

Food insecurity often brings emotional stress, fear, anxiety, and even sadness or depression among family members. Adolescent girls may feel these problems even more strongly because they go through rapid hormonal and emotional changes during this age (Islam & Tanvir, 2025). In some households, especially in South Asian cultures, when food is limited, parents tend to give priority to the father or the male children(Bashar et al., 2018). Foods that are high in protein or more expensive, such as eggs or meat, may be given mostly to males(Boraita et al., 2022; Rani & Lule, 2004). Female children and mothers often receive the smaller or less nutritious portions. This is a common cultural pattern in many South Asian families, particularly when the household lacks sufficient food.

These situations can make girls feel emotionally uncomfortable, less valued, and less secure. Sometimes they cannot eat the foods they like or need, which can make them unhappy during adolescence. Girls are usually expected to be protected and cared for by their families, but

when even basic needs like food are not met, it can reduce their sense of safety and well-being. These experiences can contribute to lower subjective well-being later in life (Haq et al., 2023).

Food insecurity affects adolescents' well-being in many ways. When basic needs like food are not met, adolescent girls may experience emotional stress, poor concentration, and lower academic performance(Lê-Scherban et al., 2016; Rezaeizadeh et al., 2024). They may face difficulties in socialising, making friendships, and staying motivated in school. Constant worries about food and family situations can lead to prolonged stress, diminished hope, lower academic performance, and reduced future aspirations. As a result, adolescents from food-insecure households often experience lower subjective well-being compared to those living in more stable families(Koly et al., 2023a).

Bangladesh operates several government-led food-related social transfer programmes that are directly relevant to this study. The Vulnerable Group Development (VGD) programme provides monthly food rations together with livelihood training to extremely poor women over a fixed cycle, while the Vulnerable Group Feeding (VGF) programme distributes emergency food assistance to households affected by disasters, seasonal food shortages, or economic shocks. The Food-Friendly Programme sells subsidised rice to low-income households, and school feeding initiatives provide meals or take-home food rations to encourage school attendance among children from food-insecure households. These programmes are coordinated under the National Social Security Strategy (NSSS) of Bangladesh, which seeks to consolidate social protection interventions within a unified, life-cycle-based framework (General Economics Division, 2015). Non-governmental organisations and international agencies also implement complementary food assistance initiatives, particularly in disaster-prone and food-insecure regions of the country.

These social support programmes aim to reduce food poverty in the country. Food-related assistance can include free food distributions, food vouchers, cash support for buying food, and school feeding programmes. These supports directly help vulnerable families, especially women and children, to improve their daily food availability. When families receive help to meet their basic needs, they worry less about daily food and survival. This can create a more peaceful home environment (Lokot et al., 2025). With reduced financial pressure, parents may have more time to focus on their children's education and emotional needs. Families may communicate more, providing better emotional support for adolescent girls.

Receiving support from the government also gives families a sense of security and stability. It helps them relax because they know they are not completely alone during difficult times. However, most food support programmes are mainly designed to reduce hunger and improve nutrition (Marmot et al., 2008; Mohammed & Warner, 2024). They are not specifically designed to improve subjective well-being or emotional health. These indirect emotional and mental benefits are rarely discussed in policy or research.

Understanding this connection, the well-being of these adolescent girls with food support assistance is important because it reveals how basic needs, such as food, are closely linked to the emotional well-being of adolescent girls. This knowledge can help policymakers design better and more effective social protection programmes in Bangladesh that support both physical and emotional well-being.

1.4 Theoretical Foundation: Social Determinants of Health (SDH)

The Social Determinants of Health (SDH) framework is one of the major theoretical foundations used in public health and social science. This framework explains that people's

health and well-being are shaped not only by medical care, but also by their social and economic situations. SDH focuses on various aspects of a person's life, including their age, education, income, employment, access to food and necessities, family environment, social connections, and living conditions. When all these areas are supported, people are more likely to enjoy good health and a better quality of life. The SDH framework also aims to create equal opportunities for everyone to achieve good health, regardless of their background.

When applying the SDH framework to the subjective well-being of adolescent girls, it becomes clear that their life satisfaction is influenced by many different factors. Household food insecurity, family income, wealth status, the girl's level of education, and the education and gender of the household head all play important roles. Whether the girl is a biological child of the household head or not can also affect her emotional comfort and support levels (Rezaeizadeh et al., 2024). All these factors can influence her happiness, safety, freedom, future goals, and social opportunities.

The SDH framework indicates that well-being is rarely influenced by a single factor. For example, if an adolescent girl faces economic stress and food insecurity at the same time, she may feel worried about her school performance, her future, and her personal safety. Adolescent girls often experience these challenges together, not separately. This means that improving only one area, such as providing food support, may not be enough to fully improve her well-being. Sometimes, multiple interconnected factors may require attention simultaneously to create meaningful change in the adolescent's well-being (Xiao et al., 2023).

In Bangladesh, social support programmes often focus on one main intervention, such as food support. While this is very important, the programmes may become even more effective if they include multiple types of support together, such as food assistance, educational support, and

mental health awareness(Marmot et al., 2008). A multi-sectoral approach can directly support the well-being of adolescent girls, rather than focusing solely on reducing hunger.

Using the SDH framework to understand food-related social transfers helps us see how these programmes influence adolescent girls. When food support helps to reduce financial stress and improves food availability, the home environment becomes more stable and comfortable. This may help adolescent girls feel safer, more protected, and more satisfied with their lives. The SDH framework also helps to analyse how different socio-demographic factors are connected to adolescent girls' subjective well-being and how these factors interact with food-related support programmes.

1.5 Rationale for the Study

In Bangladesh, the extensive literature has been on adolescent nutrition, reproductive health, education, and early marriage. Although these domains are of paramount significance, little has been done regarding the subjective well-being of adolescents, especially the most vulnerable adolescent girls between the ages of 15 and 17 years. Subjective well-being, such as life satisfaction, provides insight into how individuals evaluate their lives and compare them to objective measures like income or health condition. It is particularly relevant to understand the well-being of adolescent girls during this stage of life, as adolescence is a developmental stage characterised by rapid physical, emotional, and social development. Girls' experiences during this period may significantly impact their future educational achievements, mental well-being, family roles, and overall life paths. A closer look at subjective well-being, thus, can enable a more comprehensive analysis of the problem of adolescent development in the Bangladeshi context.

Food insecurity is a serious issue in Bangladesh, especially for the poor and vulnerable households. Despite improvements in agricultural production and poverty alleviation, many households still face uncertainty regarding the availability, quality, and stability of their food supply. To overcome this challenge, the Government of Bangladesh has implemented various food-related social transfer programmes to alleviate hunger challenges and enhance household food security (Mohammed & Warner, 2024; Nilsson et al., 2024). The available literature on such programmes has mostly focused on the effectiveness of these programmes in improving nutritional, poverty alleviation, and food consumption behaviours. Nonetheless, little empirical data exists on the impact of these interventions on psychological or emotional outcomes, particularly among adolescents. Adolescent girls, who tend to face unequal food distributions within the household and increased social vulnerability, are still remain underrepresented in the existing literature.

The Social Determinants of Health (SDH) framework offers a powerful theoretical background for the proposed study, as it emphasises the idea that health and well-being are determined by a variety of interdependent social, economic, and structural conditions. Under this framework, the well-being of adolescents is determined not only by the availability of food but also by factors such as household income, parental educational attainment, gender norms, school enrolment, and family power dynamics(Mohammed & Warner, 2024; Nilsson et al., 2024). Applying the SDH framework enables this study to discuss social transfers related to food in a wider socio-economic context, as such transfers may indirectly influence the well-being of adolescents by enhancing the stability of a household, but not necessarily by having access to food. Such a strategy helps to understand how social protection programmes relate to other factors of life satisfaction among adolescents in a more nuanced manner.

This study is also positioned within the global Sustainable Development Goals (SDGs) agenda. It speaks directly to SDG 2 (Zero Hunger), given its focus on household food-related social transfers; SDG 3 (Good Health and Well-being), given its focus on adolescent subjective well-being; and SDG 5 (Gender Equality), given its exclusive focus on adolescent girls, a population disproportionately affected by structural disadvantage in Bangladesh (United Nations, 2015). By examining whether a food-related intervention is associated with a psychosocial outcome, the study contributes evidence relevant to the interconnected, cross-sectoral nature of these global commitments.

The attention paid to girls between the ages of 15 and 17 is especially well-timed, as they are at a crucial stage of transition between early adolescence and adulthood. Girls currently tend to encounter more pressure in their educational and family roles, and an increased risk of teen marriage and school dropout(Goswami et al., 2023). Meanwhile, they possess the cognitive and emotional ability to reflect on their life situation and articulate their level of life satisfaction. In this sense, this cohort group is particularly well-suited for studying subjective well-being and its relationship to household-level interventions, including social transfers related to food.

This study utilises the UNICEF Multiple Indicator Cluster Survey (MICS) 2019, a nationally representative and internationally recognised dataset(Schmidt, 2021). The MICS provides quality and standardised data on the well-being of adolescents, household attributes, and social protection coverage in every region of Bangladesh. The analysis of a huge and heterogeneous sample is possible through the utilisation of this dataset, which increases the reliability and generalisability of the results.

Comprehensively, the research fills a notable gap in the literature, as it analyses the relationship between food-related social transfers and the life satisfaction of adolescent girls in Bangladesh. The study's results, which highlight both life satisfaction and socio-economic aspects, can inform more comprehensive and gender-sensitive social protection policies. The results can be used to inform the creation of programmes that go beyond solving food insecurity to improving the emotional and social health of adolescents.

1.6 Problem Statement

Many adolescent girls in Bangladesh grow up in households that experience different levels of food insecurity. This makes it more challenging for them to grow in a stable way, both physically and mentally. Although Bangladesh produces a large amount of agricultural food, many families still struggle to meet their daily food needs. Food insecurity is common in both urban and rural areas, but it is more prevalent among rural and lower-income households. This situation directly affects adolescent girls who live in these families and can influence their everyday life, emotional well-being, and future opportunities.

Although food-related social transfer programmes are widely implemented in Bangladesh, there is very limited evidence on whether they also support the psychological or emotional well-being of adolescent girls, as most are designed primarily to reduce hunger and improve nutrition rather than mental well-being.

There is a clear gap in understanding how food-related social transfers may be linked to the subjective well-being of adolescent girls in Bangladesh. More evidence is needed to understand whether receiving food support can help adolescent girls feel safer, more stable, and more satisfied with their lives. This study aims to help fill this gap.

1.7 Research Questions

1. What is the prevalence of self-reported life satisfaction among adolescent girls aged 15–17 in Bangladesh?
2. What proportion of households with adolescent girls receive food-related social transfers, and what are the socio-demographic characteristics of these households?
3. Is household receipt of food-related social transfers associated with self-reported life satisfaction among adolescent girls, after adjusting for potential confounders such as household wealth and education?

1.8 Research Objectives

1. To estimate the prevalence of self-reported life satisfaction among adolescent girls aged 15–17 in Bangladesh.
2. To assess the proportion of households with adolescent girls receiving food-related social transfers and describe their socio-demographic characteristics.
3. To examine the association between household receipt of food-related social transfers and life satisfaction among adolescent girls, adjusting for potential confounders such as household wealth and education.

1.9 Significance of the Study

Knowledge about the well-being of adolescents in Bangladesh is academically very important. Although many studies are available on adolescent girls, most of them focus mainly on education, reproductive health, or early marriage. There is very limited research examining the overall subjective well-being of adolescent girls aged 15–17 years, particularly using national-

level data. This study helps to fill that gap by examining the general life satisfaction of adolescent girls in Bangladesh using the MICS 2019 dataset.

There is also very little evidence on the relationship between household receipt of food-related social transfers and the well-being of adolescent girls. This study explores a new connection by seeing whether food support programmes may have an impact on girls' subjective well-being. This information will be very valuable for policymakers in Bangladesh, as it can help them understand whether these programmes support not only nutrition and hunger reduction but also emotional and psychological well-being.

Using the Social Determinants of Health (SDH) framework, this study also highlights that the well-being of adolescent girls is influenced by multiple factors. Instead, it is shaped by numerous interconnected factors, including food security, household wealth, education, and family characteristics. Understanding these multiple influences is crucial for public health professionals, enabling them to develop more effective interventions that support adolescents' mental, physical, and social well-being simultaneously.

The significance of this study is further reinforced by its alignment with both global and national policy commitments. Globally, the study contributes evidence relevant to SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), and SDG 5 (Gender Equality), as it examines whether a food-related social protection intervention is associated with the psychosocial well-being of adolescent girls (United Nations, 2015). Nationally, the findings are relevant to key Bangladeshi policy initiatives, including the National Social Security Strategy (NSSS) of Bangladesh, which seeks to consolidate social protection programmes within a unified, life-cycle-based framework (General Economics Division, 2015), and the 8th Five Year Plan (2020–2025), which prioritises women's empowerment and inclusive human development as

part of the country's broader development agenda (General Economics Division, Planning Commission, 2020). By generating evidence on the psychosocial dimension of food-related transfers, this study can help inform more holistic social protection policymaking in Bangladesh.

Because this study uses national data from the UNICEF MICS 2019 survey, it represents adolescent girls from all divisions of Bangladesh. This gives a clear understanding of the overall situation of girls aged 15–17 across the whole country. The findings are useful for national development, as improving the well-being of young girls contributes to a healthier and more productive population in the future.

Overall, this study provides important evidence that can help strengthen and improve social protection programmes and policies in Bangladesh. The results can support the mental, physical, and social development of adolescent girls nationwide, helping them grow into strong and healthy future adults.

1.10 Scope and Delimitations

This study is limited to adolescent girls aged between 15 and 17 years residing in Bangladesh. The preference for girls is explained by the limitations of such a focus on girls, who, in most South Asian and Asian cultural settings, are disproportionately susceptible to emotional, social, and mental health issues as compared to boys. The expectation of gender roles, lack of access to resources, and girls being at a disadvantage are more prevalent in low- and middle-income nations like Bangladesh. Girls have a higher likelihood of facing limitations in education, mobility, decision-making, and future opportunities, which can have a significant impact on their subjective well-being. Additionally, adolescent girls are a vulnerable population group

since their health and well-being are implicated generatively. As potential mothers in the future, their physical, emotional, and psychological health can directly influence maternal health rates and the future well-being of children, which is why this group of people becomes particularly significant to research on public health and social policies.

The age group used, 15-17 years old, was specifically chosen due to its influence, as it is a transitional period between early adolescence and adulthood. Girls at this age experience rapid physical, emotional, and cognitive growth, as well as heightened sensitivity to their social and household surroundings. Young adults at this age are better equipped to reflect on their life conditions and express their perception of contentment with life in a significant way. Additionally, girls in the 15-17 age group are likely to be at key educational and social crossroads, such as completing secondary education, facing pressures to marry early, or taking on additional household duties. All this makes this age group, especially, the best one to study subjective well-being and its correlation with the household level of social protection.

This study utilises secondary data collected in 2019 in a nationally representative survey by the UNICEF Multiple Indicator Cluster Survey (MICS). The MICS dataset provides in-depth data on adolescents, women, households, and other key socio-demographic characteristics across all divisions of Bangladesh. The secondary data enable the conduct of an analysis at a high population level and improve the generalizability of the results. Nevertheless, the use of secondary data also has some limitations. The first limitation is that the MICS measure of life satisfaction is based on a one-item measure, specifically the Cantril Ladder scale. Although the measure is well-utilised and internationally recognised, it describes only a broad assessment of subjective well-being and fails to capture more nuanced aspects, such as emotional, psychological, and contextual factors like stress, anxiety, resilience, or emotional support.

Moreover, the variables included in this study are limited to those present in the MICS 2019 dataset. Consequently, several potentially significant adolescent well-being determinants, including family emotional support, peer relationships, community safety, social connectedness, and violence or discrimination exposure, could not be studied. These aspects could be influential in determining the satisfaction in the lives of adolescent girls but could not be included in the analysis.

The other major weakness is associated with the cross-sectional quality of the MICS data. Although the research can identify the relationships between household receipt of food-related social transfers and adolescent life satisfaction, it is unable to determine the cause-and-effect relationship. This analysis captures the conditions at only one point in time and is therefore unable to indicate whether food-related social transfers directly cause changes in subjective well-being, or whether there are other unobservable factors that may simultaneously influence both variables.

Notwithstanding these limitations, the research can provide valuable insights into the status of adolescent girls in Bangladesh between the ages of 15 and 17 years. The study, which examines the relationship between subjective well-being, food-related social transfers, and socio-demographic characteristics using nationally representative data, provides valuable insights into an under-researched field. The results contribute to the advancement of knowledge regarding the well-being of adolescents in the Bangladeshi context and serve as the basis for further research and policy measures to enhance the social and psychological outcomes of adolescent girls.

1.11 Structure of the Thesis

Chapter 1: Introduction

The first chapter of the study presents the background and context of the study subject, adolescent subjective well-being, and more specifically, adolescent girls in Bangladesh. It describes the research problem and details the importance of studying the connections between social transfers associated with food and life satisfaction. The chapter outlines the research questions and objectives that provide guidance for the study and introduces the theoretical framework upon which the study will be based, specifically the Social Determinants of Health (SDH) framework. It also argues the importance of the study, its scope, and limitations, and mentions the major limitations. This chapter lays the groundwork for the entire thesis, explaining the justification, focus, and orientation of the study.

Chapter 2: Literature Review

Chapter Two provides a detailed and systematic discussion of the available literature on adolescent well-being, food insecurity, and food-related social protection programmes. The chapter discusses international and Bangladesh-specific evidence on how food insecurity and social transfers affect subjective well-being, particularly among adolescent girls. It critically reviews past empirical research, identifies gaps in the theory and methods applied, and highlights discrepancies in current research results. The literature review also summarises the literature according to the Social Determinants of Health framework, thus creating the conceptual base of the study and the necessity of the intended research in the field.

Chapter 3: Methodology

Chapter Three explains the methodology used in this study. It details the research design and justifies the necessity of the secondary data, i.e. the 2019 Bangladesh Multiple Indicator Cluster Survey (MICS). The chapter explains the study population, methods of selecting samples, and definitions of the variables, which entail measuring life satisfaction and food-related social transfers. It also describes the statistical methods used, including descriptive analysis, complex sample regressions, and sensitivity analysis, with references to ethical concerns and the limitations of these methods. With this chapter, the reproducibility and transparency of the research process are guaranteed.

Chapter 4: Results

Chapter Four presents the empirical results of the study in a coherent and understandable manner. The study begins by providing a description of the socio-demographic profile of the sample, followed by bivariate and multivariate analyses to determine the relationship between food-related social transfers and adolescent life satisfaction. The chapter presents its results in tabular and graphical formats, providing information on sensitivity analysis, subgroup comparisons, and interaction effects. In this chapter, the author presents the results without interpretation, allowing the findings to be clearly understood before further discussion.

Chapter 5: Discussion

Chapter Five explains and puts the findings of the previous chapter into context. The results are aligned with the existing literature and the framework of Social Determinants of Health, highlighting areas of agreement and divergence. The chapter discusses the potential reasons behind the absence of a relationship between food-related social transfers and life satisfaction but focuses on the importance of more general socio-economic and structural factors. There

are also policy and programmatic implications discussed, with specific reference to how social protection measures regarding adolescent girls can be improved in Bangladesh.

Chapter 6: Conclusion and Recommendations

The last chapter is the conclusion of the study, summarising the main findings and re-examining the objectives and questions of the research. It provides the key conclusions of the analysis and explains the overall impact of the study on the knowledge and policy. The chapter offers practical recommendations to policymakers, development practitioners, and social protection programmes, as well as suggestions for future research. The chapter concludes by emphasising the need to refine integrated methods to improve the subjective well-being of adolescent girls in Bangladesh.

2 Systematic Literature Review

2.1 Introduction to the Review

This chapter presents a systematic literature review of existing empirical data examining the relationship between food-related social transfers and life satisfaction or subjective well-being among children and adolescents aged 0-17 years, with particular relevance to adolescent girls aged 15-17 years. Adolescent well-being is widely recognised as a public health and development priority because adolescence is a developmental life stage when the social, economic, and environmental conditions may have long-term implications on health and well-being throughout the lifespan (World Health Organization, 2014; UNICEF, 2021). The synthesis of the review is conducted using an open and thorough methodological procedure, focusing on identifying gaps in the current literature that justify the implementation of the current study.

Unlike a more conventional narrative literature review, a systematic review approach is adopted in this chapter, supported by the PRISMA 2020 reporting framework (Page et al., 2021). This framework facilitates the clear presentation of search methods, inclusion and exclusion criteria, study selection procedures, and quality evaluation procedures. This approach improves the credibility, transparency, and reproducibility of the review. The literature includes both quantitative observational findings, such as cross-sectional studies, and qualitative evidence, reflecting the range of empirical designs used in research examining the relationship between food-related social protection interventions and child and adolescent well-being outcomes.

The review is structured based on the Population-Exposure-Outcome (PEO) framework (Bettany-Saltikov, 2010), a structured framework that guides the process of identifying and incorporating studies in answering the research question. The target population was broadened to children and adolescents aged 0-17 years, including both boys and girls, in order to maximise the sensitivity of the search; particular attention was given to evidence relevant to adolescent girls aged 15-17 years, as this group is the focus of the present study and has been established as particularly susceptible to socio-economic deprivation, food insecurity, and gender-based disparities (UNICEF, 2021). Household receipt of food-related social transfers and food-based social protection is the exposure, and life satisfaction, subjective well-being, and closely related psychosocial well-being outcomes are the outcomes of interest. The use of a narrative synthesis approach was based on the expected heterogeneity of the studies in terms of their settings, designs, outcomes, and methods of analysis.

In addition to a summary of the literature, this chapter is placed within the framework of Social Determinants of Health (SDH), which implies that more widespread structural, social, and household-level influences (poverty, food insecurity, education, and gender norms) interplay to determine the well-being of adolescents (Marmot et al., 2008; World Health Organization, 2010). The chapter describes the review methodology, a narrative synthesis, and identifies key evidence gaps, thereby informing the design and objectives of the present study.

2.2 Review Type and Synthesis Plan

This study employs a systematic literature review (SLR) design, focusing primarily on observational quantitative evidence including cross-sectional studies, cohort studies, and quasi-experimental evaluations of interventions or exposures where random allocation is not employed, while also allowing for the inclusion of qualitative and mixed-methods studies

where these directly addressed the review question. A narrative synthesis approach is applied because the included studies are expected to vary in their definitions of exposure, outcome measures, populations, designs, contexts, and analytical approaches, making statistical pooling (meta-analysis) inappropriate or unreliable. The review process is reported in line with PRISMA 2020 (Page et al., 2021) to ensure transparent identification, screening, eligibility assessment, and inclusion of studies.

2.3 PEO Framework (Population–Exposure–Outcome)

The systematic literature review was structured using the Population–Exposure–Outcome (PEO) framework to define the key components of the review and to support a transparent and focused identification of relevant studies. The PEO framework was applied to ensure consistency between the review objectives, search strategy, eligibility criteria, and synthesis approach, thereby maintaining methodological rigour throughout the review process.

The population component of the framework was broadened to children and adolescents aged 0–17 years, including both boys and girls, in order to maximise the sensitivity of the search and capture the widest possible range of relevant evidence. Within this broader population, particular attention was given to evidence relevant to adolescent girls aged 15–17 years, reflecting the target group of the present study. This age group represents a critical developmental stage and has been identified as particularly vulnerable to socio-economic and household-level influences in low- and middle-income country settings.

The exposure component comprised household- or child-level receipt of food-related social transfers and food-based social protection programmes. These included in-kind food assistance, food rations, food vouchers, food baskets, food stamps, school meals and school

feeding programmes, and other structured food distribution or nutritional assistance interventions designed to improve household or child food security.

The outcome component focused on life satisfaction, subjective well-being, and closely related constructs, operationalised through quantitative measures such as life satisfaction scales, happiness indicators, health-related quality of life measures, well-being indices, and psychosocial, psychological, emotional, or mental well-being measures, as well as qualitative accounts of well-being, food security, and financial stress, where these were explicitly framed as indicators of subjective well-being.

The application of the PEO framework informed the formulation of the review question and guided the development of search terms, study selection criteria, and the narrative synthesis of the included literature. The review question derived from the PEO framework was: Among children aged 0–17 years, what is the association between household receipt of food-related social transfers and life satisfaction or subjective well-being outcomes, with particular relevance to adolescent girls aged 15–17 years?

2.4 Eligibility Criteria

Table 2: Eligibility Criteria for Study Selection (PEO Framework)

Criterion	Inclusion Criteria	Exclusion Criteria
Population (P)	Studies including children and adolescents aged 0–17 years. Studies may include boys, girls, or mixed child populations, provided child-specific data are available. Priority was given to studies	Studies focusing exclusively on adults aged 18 years or above, without any extractable child-specific data.

	reporting extractable data for girls aged 15–17 years, as this age group corresponds to the study population defined in the research question and represents late adolescence, during which individuals can reliably self-report life satisfaction.	
Exposure (E)	Studies examining food-related social transfers or food-based social protection, including in-kind food transfers, food aid, ration programmes, food vouchers, food baskets, food stamps, school meals, school feeding programmes, or other structured food distribution or nutritional assistance schemes.	Studies examining non-food-based interventions only, such as unconditional cash transfers without a food component, or programmes unrelated to food or social protection.
Outcome (O)	Studies reporting life satisfaction, subjective well-being, happiness, quality of life, psychosocial, psychological, emotional, or mental well-being, or other closely related self-reported well-being outcomes, measured using validated scales, clearly defined quantitative indicators, or, for qualitative studies,	Studies reporting only nutritional, anthropometric, or health outcomes without any measure of life satisfaction or subjective well-being.

	clearly reported thematic findings on well-being.	
Study Design	Observational quantitative studies, including cross-sectional studies, cohort studies, case–control studies, and quasi-experimental evaluations (e.g., difference-in-differences, propensity score matching, interrupted time series), as well as qualitative and mixed-methods studies directly addressing the review question.	Randomised controlled trials (if outside scope), theoretical papers, editorials, commentaries, and protocols without empirical findings.
Publication Type	Peer-reviewed journal articles reporting original empirical research with clearly described methodology and results.	Conference abstracts without full papers, grey literature (including reports from international organisations, NGOs, or government bodies), opinion pieces, policy briefs without methods, editorials, commentaries, and other non-empirical publications.

Time Period	Studies published between 2000-2026, reflecting contemporary social protection and well-being research.	Studies published outside the defined time.
Language	Studies published in English.	Studies published in languages other than English, where translation was not feasible.
Geographical Scope	Studies conducted in any country or setting, with particular relevance to low- and middle-income countries, South Asia, and Bangladesh where applicable.	None; studies from all geographical settings were eligible for inclusion, in order to maximise the sensitivity of the search.

2.5 Search Strategy

A systematic search strategy was thoroughly and systematically formulated to determine the association between food-related social transfers and life satisfaction or subjective well-being among children and adolescents, with particular relevance to adolescent girls. The search strategy was informed by the PEO framework (Population–Exposure–Outcome) to ensure compliance with the review objectives and maximise sensitivity while maintaining relevance. Following initial screening, the search terms were substantially broadened to incorporate a wider range of synonyms and controlled vocabulary terms for the population, exposure, and outcome components, in order to reduce the risk of omitting eligible studies. The main terms concerning children and adolescents, food-based social protection, and subjective well-being

were identified, and controlled vocabulary (when feasible) and free-text keywords were combined.

Search terms associated with the population included variations of child and adolescent descriptors, such as adolescent, adolescents, teenager, teen, youth, young people, young person, young women, female adolescent, adolescent girl, young girl, young female, schoolgirl, child, children, paediatric, and pediatric. Terms concerning exposure included food-related social transfers and food-based social protection, such as food-related social transfer, food transfer, food assistance, food aid, food voucher, food ration, food support, food distribution, in-kind transfer, school feeding, school meal, feeding programme, food subsidy, food supplementation, nutrition support, social protection, food-based social protection, safety net, social safety net, public food distribution, and food security programme. Outcome-related terms captured dimensions of well-being, such as life satisfaction, subjective well-being, well-being, wellbeing, happiness, quality of life, psychological well-being, mental well-being, emotional well-being, self-rated well-being, self-reported well-being, life evaluation, and life quality. The Boolean operators used to combine these terms were synonyms connected with the word "OR", and the main blocks of the concept related to each other with the word "AND".

One of the generic search strings that was used in the databases was:

(adolescent* OR adolescents OR adolescen* OR teenager* OR teen* OR youth OR "young people" OR "young person*" OR "young women" OR "female adolescent*" OR "adolescent girl*" OR "young girl*" OR "young female*" OR schoolgirl* OR child* OR children OR pediatric* OR paediatric*)

AND ("food-related social transfer*" OR "food transfer*" OR "food assistance" OR "food aid" OR "food voucher*" OR "food ration*" OR "food support" OR "food distribution" OR "in-

kind transfer*" OR "school feeding" OR "school meal*" OR "feeding programme*" OR "food subsidy" OR "food supplementation" OR "nutrition support" OR "social protection" OR "food-based social protection" OR "safety net*" OR "social safety net*" OR "public food distribution" OR "food security programme")

AND ("life satisfaction" OR "subjective well-being" OR wellbeing OR "well-being" OR happiness OR "quality of life" OR "psychological well-being" OR "mental well-being" OR "emotional well-being" OR "self-rated well-being" OR "self-reported well-being" OR "life evaluation" OR "life quality")

Database-specific modifications were made where necessary to accommodate variations in indexing terms, search fields, and controlled vocabularies.

To enhance the level of transparency and reproducibility, the same search strategy was applied across all selected databases, with minor adjustments made to accommodate the specific requirements of each database. Included studies and other related review articles were also manually screened on their reference lists to identify additional eligible studies that might have been missed in the electronic searches. Search results have been recorded, including the search terms, databases searched, and date of searching, to aid in the later PRISMA reporting of the review process.

2.6 Information Sources

To align with the review aim and ensure consistency, the search was limited to peer-reviewed academic journal articles. PubMed, Scopus, Web of Science, PsycINFO, and CINAHL were used for the search, as these databases provide comprehensive coverage of high-quality research across multidisciplinary fields related to public health, social policy, development

studies, psychology, and subjective well-being. Google Scholar was used as a search engine to minimise the risk of missing peer-reviewed studies not indexed by the chosen databases. Only peer-reviewed journal articles with accessible full text that met the inclusion criteria were included. The searches were conducted between 30 April 2026 and 15 July 2026, and all search outputs and screening decisions related to the search were recorded in accordance with the PRISMA 2020 reporting requirements.

2.7 Study Selection Process

The study selection process was systematic and transparent, following the 2020 PRISMA guidelines. After completing the database searches, all identified records were exported into Microsoft Excel, where the data could be managed. Records that overlapped in the various databases and information sources were removed prior to the screening process. The other distinct records were then screened in two stages with respect to the predetermined eligibility criteria.

The first step was to remove titles and abstracts that were obviously not within the scope of the review, including those that involved populations unrelated to adolescents, interventions not connected to food-based social transfers, or whose results were not related to life satisfaction or subjective well-being. Articles which seemed to be of interest were selected to be reviewed in full text. During the second phase, the shortlisted studies were reviewed in detail against the inclusion and exclusion criteria, and those that met the criteria were retrieved in full-text format. Exclusion criteria at the full-text level were systematically captured, including ineligible population, exposure, outcome, study design, or type of publication.

The researcher conducted the screening and selection process in a way that minimised selection bias to the extent that the same eligibility criteria were used throughout the stages. The last group of studies that met the inclusion criteria was incorporated into the systematic review and contributed to the data extraction, quality assessment, and narrative synthesis. Identification, screening, eligibility checks, and inclusion of all studies are summarised using a PRISMA 2020 flow diagram, which is provided in Section 2.14.

2.8 Data Extraction

The extraction of data was carried out systematically and methodically to ensure consistency and accuracy across all included studies. A standardised data extraction form was created in Microsoft Excel prior to the review process and pilot-tested on a few studies to assess its appropriateness and understandability. This strategy enabled the systematic acquisition of study characteristics and findings that aligned with the review's goals.

For each study included, the most important and relevant information was extracted, including bibliographic details (author(s) and year of publication), country and study setting, study design (cross-sectional, cohort, or quasi-experimental), and sample characteristics (sample size, age range, and gender composition). Information about the exposure was also captured, including the nature of the food-related social transfer or food-based social protection programme being analysed, as well as the measurement of exposure. Data related to outcome aspects, such as measures of life satisfaction or subjective well-being, including the data or instruments to be used and the timing of outcome assessment.

Additionally, methodological and analytical data were collected, including the statistical procedures used, the main confounding variables considered during the analysis, and the

primary results regarding the association between food-related social transfers and subjective well-being. Where possible, the effect estimates, direction of association and statistically significant measures were documented. The authors also reported limitations in the study, which were documented. The data were extracted and used to build a quality appraisal and narrative synthesis, which ensured that comparisons between studies were systematic and transparent.

2.9 Quality Appraisal (risk of bias)

The quality and risk of bias of the studies included in this systematic literature review were critically appraised to ensure the validity and strength of the evidence synthesis. Since only an observational research design was considered in the review, the selection of appraisal tools was made by properly standardising them to suit methodological variation between the studies, while still providing a simple and clear assessment process (Schmidt, 2021).

An overview of the quality review and risk of bias analysis of each of the included studies is presented in **Appendix 01.**

At the item level, all three cross-sectional studies (Yang et al., 2022; Brushett et al., 2024; Diamantis et al., 2023) received a ‘Yes’ rating across all eight JBI Analytical Cross-Sectional Checklist criteria. Each study clearly defined its inclusion criteria and study setting, measured exposure (Free School Meal status, DIATROFI programme participation, or dietary intake) using structured or validated instruments, used standardised outcome measures (child mental health indicators or the validated PedsQL Health-Related Quality of Life instrument), identified and statistically adjusted for relevant confounders such as socio-economic status and family affluence, and applied appropriate multivariable regression analyses with confidence

intervals. A key strength across these studies was their large sample sizes (ranging from 2,166 to 6,583 participants) and use of validated outcome instruments; a shared limitation, common to cross-sectional designs, is that temporal or causal relationships between food-related social transfers and well-being outcomes cannot be established. The qualitative study (McKelvie-Sebileau et al., 2023) received a 'Yes' rating across all ten JBI Qualitative Checklist criteria, reflecting strong congruity between its social constructivist philosophy, exploratory qualitative design, data collection through focus groups and interviews, inductive thematic analysis, and interpretation of findings, along with clear researcher positionality and appropriate ethical approval. A strength of this study was its rich, multi-perspective account of food security, well-being, and financial stress from students, families, and school principals; its main limitation was the small number of schools and participants involved, which restricts the generalisability of its findings beyond the specific New Zealand context studied.

The Joanna Briggs Institute (JBI) critical appraisal instruments were used because they are specifically designed to assess the methodological quality and risk of bias of both quantitative and qualitative studies in public health and social science research (Yasmin et al., 2023). In particular, the JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies was used to evaluate the three cross-sectional studies, and the JBI Critical Appraisal Checklist for Qualitative Research was used to evaluate the one qualitative study included in the review. The importance of these instruments lies in the fact that they offer a structured criterion for evaluating the internal validity, methodological rigour, and analytical or interpretive adequacy of both non-randomised quantitative studies and qualitative research (Rahman, 2013).

All the included studies were evaluated in accordance with the important domains of methodology, such as the clarity of inclusion and exclusion criteria, the appropriateness of the study population, validity and reliability of exposure and outcome measurements, the

identification and control of confounding factors, the adequacy of statistical analysis that was conducted, and completeness and transparency of the outcome reporting (Mennella, 2014; Wang et al., 2021). Studies were rated under each of the appraisal items as to whether they met, did not meet, or were unclear, depending on the degree to which methodological standards were met.

Based on the overall appraisal results, three of the four included studies (Yang et al., 2022; Brushett et al., 2024; Diamantis et al., 2023) were rated as having a moderate risk of bias. Each of these cross-sectional studies met all eight JBI criteria, including clear inclusion criteria, detailed description of subjects and settings, valid and reliable measurement of exposure and outcome, identification of and adjustment for confounding factors, and appropriate statistical analysis; however, their cross-sectional design means that causal or directional inferences cannot be drawn, which was the basis for the moderate risk rating. The remaining study (McKelvie-Sebileau et al., 2023), a qualitative study, met all ten JBI qualitative criteria, including congruity between philosophy, methodology, data collection, analysis, and interpretation, clear researcher positionality, adequate participant representation, and ethical approval. Nonetheless, this study was rated as having a high risk of bias in terms of generalisability, owing to its small, single-country sample drawn from a limited number of schools.

Notably, no study was eliminated based solely on the quality appraisal scores. Rather, the results of the quality assessment were considered as part of the narrative synthesis, with studies employing more rigorous methods given greater interpretative weight (Anschutz et al., 2009; Cairns et al., 2013; H. G. Dixon et al., 2007). The studies rated as being at a higher risk of bias were treated cautiously and used to aid understanding of the context, rather than to draw any

conclusive results. This method aligns with the PRISMA 2020 recommendation that it is crucial to consider the risks of bias when integrating evidence, rather than filtering studies.

On balance, the systematic review was reinforced by the quality appraisal process, which ensured that the conclusions were based on the most methodologically sound evidence available and that the limitations of observational studies on food-based social protection and subjective well-being in adolescents were explicitly stated.

2.10 Narrative Synthesis Plan

It was found that a narrative synthesis strategy was suitable for incorporating the findings of the included studies, as it was expected that the different studies had heterogeneity in their designs, types of interventions, outcome measures, and methods of analysis. This method was employed to facilitate a structured and systematic comparison of evidence without statistical pooling, which was deemed unsuitable due to the variability among the studies. The narrative synthesis adhered to a set of principles for synthesising observational evidence and was conducted in an open and replicable manner.

Three analytical dimensions were used to organise the narrative synthesis. The studies were first selected based on the form of food-related social transfer under investigation, such as in-kind food transfers, food vouchers, school feeding programmes, and expanded food-based social safety net programmes (Asfahani et al., 2019). Second, synthesis of evidence was done in terms of population focus, drawing a distinction between studies that only examine adolescent girls and those that incorporate mixed adolescent populations with disaggregated or subgroup analysis of girls (Gulema et al., 2024; Sherr et al., 2021). Third, the comparison of

findings was made based on the nature of outcome measures, as direct measures of life satisfaction were distinguished by broader measures of subjective or psychosocial well-being.

The synthesis notes consistency and variation in the results within each thematic grouping, considering the study design, sample characteristics, analytical methods, and the degree to which major confounding factors were considered. The direction and intensity of reported relations between food-related social transfers and subjective well-being effects were summarised descriptively as positive, negative, or null, where other similar estimates of effects were available, and relative magnitudes were discussed. The quality appraisal findings were incorporated into the synthesis, and the methodological strengths and limitations of each study were considered when interpreting the evidence. Such a systematic narrative method made it possible to detect patterns, gaps, and limitations in the current evidence base, thereby justifying the current research.

2.11 Narrative Synthesis of the Literature

This section presents a narrative synthesis of the evidence, organised around key conceptual areas identified across the included empirical studies.The synthesis is designed to combine and compare the results of studies, rather than presenting a descriptive, study-by-study summary, to establish patterns of convergence and divergence, and identify gaps in the current body of knowledge.

The narrative synthesis falls within the context of the Social Determinants of Health (SDH) framework, which acknowledges that the well-being of adolescents is influenced by interacting structural, social, and household-level factors. The thematic organisation of the synthesis facilitates a clearer interpretation of the interactions between food-related social transfers and

socio-economic conditions, which in turn affect life satisfaction and subjective well-being among adolescent girls, while remaining consistent with the principles of narrative synthesis.

2.12 Overview of Included Studies

The systematic literature review was based on four peer-reviewed studies published between 2022 and 2024, which investigated school-based food-related social transfer programmes and their association with child and adolescent well-being outcomes (Yang et al., 2022; Brushett et al., 2024; Diamantis et al., 2023; McKelvie-Sebileau et al., 2023). Three studies used quantitative cross-sectional designs (Yang et al., 2022; Brushett et al., 2024; Diamantis et al., 2023), and one used an exploratory qualitative design (McKelvie-Sebileau et al., 2023). Sample sizes for the quantitative studies ranged from 2,166 to 6,583 participants, while the qualitative study drew on five focus groups and four principal interviews across four schools.

The evidence base was geographically concentrated in high-income countries, with two studies conducted in Greece (Brushett et al., 2024; Diamantis et al., 2023), one in the United Kingdom (Yang et al., 2022), and one in New Zealand (McKelvie-Sebileau et al., 2023); no eligible studies were identified from Bangladesh, South Asia, or other low- and middle-income country contexts. Participants across the included studies comprised children and adolescents, and none of the included studies focused exclusively on adolescent girls or reported findings disaggregated specifically for girls aged 15–17 years. The exposures in all four studies were school-based food assistance programmes (free school meals, the DIATROFI food aid and nutrition programme, or the Ka Ora, Ka Ako free school lunch programme), rather than a household-level food transfer. Outcome measures varied across studies and included child

mental health indicators, health-related quality of life (measured using the validated PedsQL instrument), and qualitative accounts of well-being, food security, and financial stress; none of the included studies specifically measured life satisfaction using a validated life satisfaction scale.

2.13 Thematic Synthesis of the Literature

This section synthesises the findings of the four included studies (Yang et al., 2022; Brushett et al., 2024; Diamantis et al., 2023; McKelvie-Sebileau et al., 2023) thematically, drawing on the data extraction and quality appraisal presented above. Rather than providing a purely descriptive, study-by-study summary, the synthesis compares the findings across studies to establish areas of convergence and divergence, and to identify gaps relevant to the present study. The synthesis is placed in the context of the Social Determinants of Health (SDH) framework, which underscores that the well-being of children and adolescents is shaped by the combination of structural, social, and household-level factors. This approach supports a clearer understanding of how school-based and household-level food-related social transfers relate to child and adolescent well-being, and highlights where the existing evidence does, and does not, extend to the specific population, exposure, and outcome of interest in the present study adolescent girls aged 15-17 years in Bangladesh.

2.13.1 Food-Related Social Transfers and Child and Adolescent Well-Being

Across the four included studies, there is consistent evidence that food-related social transfers delivered through schools are associated with better child and adolescent well-being outcomes. Brushett et al. (2024) found that healthier dietary patterns associated with the DIATROFI food aid programme were significantly associated with better overall, physical, emotional, and

school-functioning health-related quality of life (HRQoL) among Greek schoolchildren. Similarly, McKelvie-Sebileau et al. (2023) reported that New Zealand's Ka Ora, Ka Ako free school lunch programme was perceived by students, families, and school principals to improve child food security, family financial well-being, and a sense of dignity (mana), although implementation challenges such as food waste and unpalatable menu choices were also identified.

At the same time, evidence from Yang et al. (2022) suggests that food-related social transfers do not uniformly benefit all children. In this UK study, food-insecure children who were also receiving Free School Meals had the highest probability of poor mental health – higher than food-secure children and food-insecure children not receiving the meals – indicating that current eligibility thresholds for food-related support may fail to reach some of the most vulnerable children. This finding is consistent with Diamantis et al. (2023), who found that first- and second-generation immigrant children participating in the same type of food-aid and nutrition programme had significantly poorer baseline HRQoL than non-immigrant peers, an association that was heavily influenced by family affluence rather than programme participation itself. Together, these findings suggest that household- and family-level socio-economic disadvantage can persist, and in some cases dominate, even where children are already receiving school-based food-related support.

2.13.2 Limited Evidence on Gendered Dimensions of Well-Being

None of the four included studies reported findings disaggregated by sex, nor did any focus specifically on adolescent girls as a distinct analytical group. Yang et al. (2022) reported that 49.7% of their sample of child-parent dyads were female, but did not present separate analyses

for girls. The remaining three studies did not report the sex composition of their samples in relation to outcomes at all.

This represents an important gap in the current evidence base. As the wider literature on gender and adolescent well-being suggests, girls may face distinct structural and cultural constraints – for example, around access to education, decision-making, and exposure to gender-based expectations – that can shape how they experience and benefit from food-related social protection differently to boys (Barrientos et al., 2014). However, this proposition could not be tested using the studies identified in the present review, none of which reported sex-disaggregated findings for the association between food-related transfers and well-being.

This absence of gender-disaggregated evidence in the included studies supports the rationale for examining adolescent girls as a distinct analytical category in the present study, rather than assuming that findings from mixed-sex samples apply equally to girls. Without gender disaggregation, there is a risk of masking potential inequalities and underestimating the specific vulnerabilities faced by adolescent girls in relation to food-related social protection and well-being.

2.13.3 Food Insecurity, Nutrition, and Psychosocial Well-Being

The connection between food insecurity and psychosocial well-being is directly supported by the findings of Yang et al. (2022), who found that food-insecure children in the UK had markedly higher odds of poor mental health (measured through self-reported stress and worry) than food-secure children. This finding is consistent with the wider view that food insecurity affects not only physical health but also emotional and psychological well-being (Leme et al., 2015).

None of the four included studies specifically examined intra-household food allocation or gender differences in food access; however, the wider literature suggests that girls may be more likely to experience disadvantageous food allocation within households during periods of food shortage, which can affect their sense of fairness, safety, and self-esteem.

The included studies also point to the way food insecurity and nutrition-related interventions intersect with other social determinants. Diamantis et al. (2023) found that the poorer HRQoL observed among immigrant children was heavily influenced by family affluence, rather than immigration status or programme participation alone, suggesting that food-related interventions operate within, rather than independently of, broader patterns of household disadvantage. This supports the view that food insecurity and food-related social protection should be considered as part of a wider pattern of socio-economic disadvantage, rather than as an isolated risk factor.

2.13.4 Social Transfers and Subjective Well-Being concerning Food

All four included studies examined school-based food-related social transfer programmes – free school meals in the UK (Yang et al., 2022), the DIATROFI food aid and nutrition programme in Greece (Brushett et al., 2024; Diamantis et al., 2023), and New Zealand's Ka Ora, Ka Ako free school lunch programme (McKelvie-Sebileau et al., 2023). Across these studies, there is evidence that such programmes are associated with improved food security and, in some cases, better well-being outcomes; however, the strength and consistency of this association varied by outcome measure and subgroup.

Brushett et al. (2024) and McKelvie-Sebileau et al. (2023) reported broadly positive associations between programme participation and well-being-related outcomes: healthier dietary patterns were linked to better HRQoL, and stakeholders described improved food

security, financial relief, and a sense of dignity. In contrast, Yang et al. (2022) found that receipt of Free School Meals did not fully offset the mental health risks associated with food insecurity, and Diamantis et al. (2023) found that broader household disadvantage (family affluence) continued to shape well-being outcomes despite programme participation. Such contrasting findings demonstrate that food-related transfers can reduce material deprivation and improve some aspects of well-being, but are not consistently sufficient to overcome the effects of wider socio-economic disadvantage on children's psychosocial well-being (Hopkins Bloomberg et al., 2022).

A shared limitation across the included studies is that food-related social transfers were generally evaluated in terms of nutritional adequacy, dietary quality, or general HRQoL, rather than being explicitly linked to life satisfaction as a distinct construct. None of the four studies used a validated life satisfaction scale, such as the Cantril Ladder used in the present study. Consequently, while the reviewed evidence supports a broad association between food-related social transfers and child well-being, it does not directly establish whether such transfers are associated with life satisfaction specifically among adolescent girls.

2.13.5 Evidence Gaps in the Bangladeshi Situation

None of the four studies identified through the systematic search were conducted in Bangladesh, South Asia, or in a comparable low- or middle-income country context; all four were set in high-income countries (Greece, the United Kingdom, and New Zealand). Existing literature on Bangladesh highlights the comprehensive coverage and significance of national food-based social protection programmes in addressing extreme food insecurity, but evaluations of these programmes have tended to focus on efficiency, targeting accuracy, and

nutritional outcomes, with little attention to adolescent psychosocial or subjective well-being (Yaya et al., 2019).

This represents a substantial gap in the evidence base. The systematic search identified no studies examining the association between household- or school-based food-related social transfers and life satisfaction or subjective well-being specifically among adolescent girls in Bangladesh or similar low- and middle-income country settings. Combined with the absence of sex-disaggregated findings noted earlier, this gap constrains current understanding of whether the patterns observed in high-income country school-feeding programmes extend to household-level food transfers and adolescent girls' life satisfaction in the Bangladeshi context.

2.13.6 Synthesis Using the Social Determinants of Health Framework

The findings of the four included studies can be interpreted using the SDH framework, which holds that well-being among children and adolescents is shaped by the interrelation of structural, social, and household-level factors. Consistent with this framework, Diamantis et al. (2023) found that family affluence, rather than food-aid programme participation alone, was a key factor shaping HRQoL outcomes, while Yang et al. (2022) found that food insecurity – itself linked to household economic circumstances – was more strongly associated with child mental health than receipt of Free School Meals alone. These findings support the SDH view that food-related social transfers operate alongside, rather than instead of, broader socio-economic determinants of well-being (Bhutta et al., 2025; EKİNÇİ, 2024).

Overall, three key insights emerge from the synthesis of the four included studies. First, school-based food-related social transfers are consistently associated with improved food security and, in some studies, better health-related quality of life, but their association with broader psychosocial or mental well-being outcomes is less consistent and appears to depend on

underlying household socio-economic circumstances. Second, none of the included studies examined household-level food transfers, adolescent girls specifically, or life satisfaction as a distinct outcome, meaning the applicability of this evidence to the present study's population, exposure, and outcome of interest is limited. Third, evidence from Bangladesh, South Asia, or other low- and middle-income countries on this topic remains largely absent from the peer-reviewed literature identified through this systematic search.

These literature gaps provide a compelling rationale for the present study, which explores the association between household receipt of food-related social transfers and the self-reported life satisfaction of adolescent girls aged 15-17 years, using nationally representative data from Bangladesh.

2.14 PRISMA Flow Diagram

The process of identifying, screening, and selecting studies was conducted in accordance with the PRISMA 2020 reporting guidelines. A total of 4,192 records were identified from database searches. After removing 1,498 duplicate records (with no records marked as ineligible by automation tools or removed for other reasons), 2,694 records were screened at title and abstract level, of which 2,671 were excluded. Following title and abstract screening, 23 reports were sought for full-text retrieval, of which three could not be retrieved. The remaining 20 reports were assessed for eligibility against the predefined criteria; 16 were excluded (wrong study design, n = 4; wrong exposure, n = 3; wrong outcome, n = 6; wrong publication type, n = 2; duplicate record, n = 1), resulting in four included studies. Figure 1 summarises the flow of records through the various phases of the review process, from identification to final inclusion.

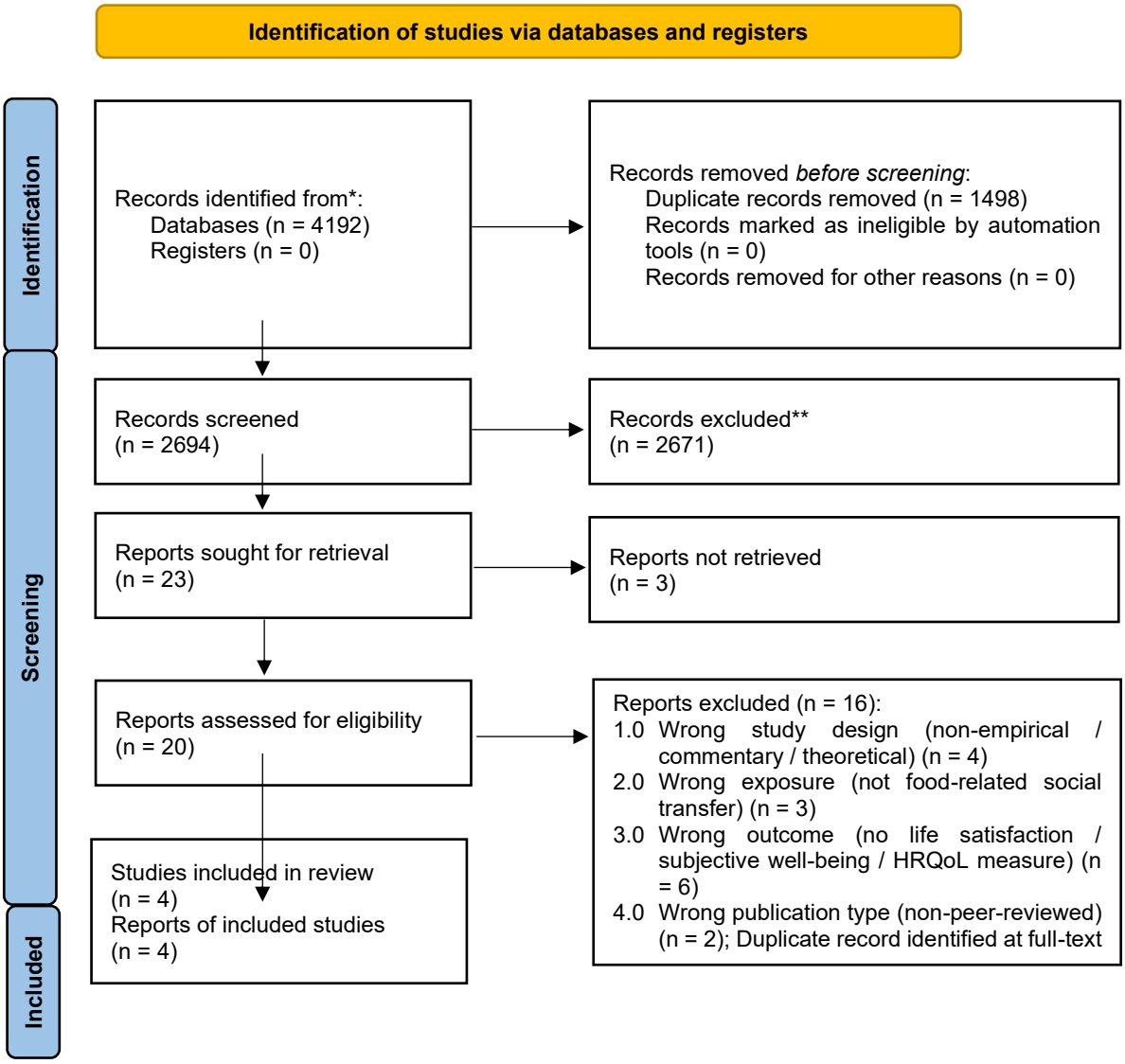


Figure 1: PRISMA Diagram

3 Research Methodology

3.1 Data Source and Study Design

This study utilised data from the 2019 Bangladesh Multiple Indicator Cluster Survey (MICS), conducted by the Bangladesh Bureau of Statistics (BBS) in collaboration with UNICEF Bangladesh as part of the global MICS programme. The 2019 Bangladesh MICS survey primarily focuses on women and children, covering various indicators, including health, education, and demographic characteristics. (Bangladesh Bureau of Statistics & UNICEF, 2019)

The 2019 Bangladesh MICS Survey collected data from the entire country, including sixty-four districts across all eight divisions: Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet. This covered both rural and urban areas. This survey used a two-stage stratified cluster sampling design. The survey included a total of 64,000 households, with 3,220 primary sampling units (PSUs) selected for data collection (Bangladesh 2019 MICS ReportEnglish, 2019).

Data collection was conducted using Computer-Assisted Personal Interviewing (CAPI). Data were collected directly from respondents within each sampled household: a knowledgeable adult household member provided information for the household roster and household-level modules, while eligible women and girls aged 15–49 years, including the adolescent girls aged 15–17 years analysed in this study, were interviewed individually using the Individual Women's Questionnaire, which included the Life Satisfaction module (Bangladesh Bureau of Statistics & UNICEF, 2019). The main fieldwork was conducted between January 19 and June 1, 2019, by trained interviewers under the supervision of field coordinators throughout the data collection period.

Data were securely stored using the Internet File Streaming System (IFSS) in the central office of the Bangladesh Bureau of Statistics (BBS). After data cleaning and validation, the dataset was made publicly available as an anonymised dataset on the UNICEF MICS website. A full description of the dataset is available on the MICS website (https://mics.unicef.org/surveys). For this study, only female adolescents aged 15–17 years were selected, based on the research objectives.

3.1.1 Justification for Use of Secondary Data

The primary type of data used in the work was secondary, as it is the most suitable for meeting the research requirements, and due to access to a high-quality dataset with national representation. The Multiple Indicator Cluster Survey (MICS) 2019 of Bangladesh provides detailed and standardised data on socio-economic aspects, health, education, and subjective well-being of women and children in Bangladesh. Since the current study sets out to test the hypotheses by examining the relationship between household social food transfers and life-satisfaction among adolescent girls at the national level, the MICS dataset is a robust empirical base that would be difficult to achieve with primary data collection under the terms of time, resources, and complex logistics as would be obtained in an MSc dissertation.

The secondary data enable the secondary analysis of large-scale collections of data that have been accumulated under stringent methodological demands. The MICS programme adheres to internationally accepted survey procedures, including probability-based sampling, standardised questionnaires, and extensive interviewer training, which enhance the reliability and validity of the data. Notably, the dataset contains a large and representative sub-sample of adolescent girls aged 15-17, which will allow for statistically significant analysis of this vulnerable group of the population and make the results more generalizable.

The use of secondary data is also justified by the ethical considerations. Primary research on adolescents, especially on a sensitive topic like self-reported life satisfaction, would necessitate complicated ethical approval processes and would potentially force participants to experience extra emotional or psychological stress. This study will not involve direct participation from individuals, yet it will still address a significant issue in public health and social policy by utilising anonymised secondary data that have been previously approved by the Bangladesh Bureau of Statistics and UNICEF.

Secondary data analysis is known to restrict the choice, measurement, and operationalisation of variables that the researcher has. Nevertheless, this weakness is alleviated in the current research, as the variables in the MICS 2019 data align well with the research goals. The life satisfaction measures, household socio-economic measures, and food-related social transfers are well-defined and suitable for answering the research questions. Consequently, despite some inherent drawbacks of secondary data, the MICS 2019 dataset is a valid, reliable, and methodologically suitable dataset for considering the association between food-related social transfers and life satisfaction among adolescent girls in Bangladesh.

3.1.2 Research Design and Analytical Approach

The research design employed in this study was an integrated research design, comprising a systematic literature review (SLR) and a quantitative, cross-sectional analysis of secondary data. Chapter 2 presents a systematic literature review conducted in accordance with PRISMA 2020, which was used to synthesise the available observational data on food-related social transfers and life satisfaction among adolescent girls. The results of the SLR were used to select variables, determine the structure of the analysis, and describe the regression models employed in the quantitative analysis.

The study design involved analysing secondary data using a quantitative and cross-sectional research approach. The cross-sectional design is suitable for testing the relationship among variables at a single point in time and is commonly used in population-based studies to examine social, economic, and health-related outcomes. The design employed in this study enables the evaluation of the association between household food-related social transfers and self-reported life satisfaction in adolescent girls, while controlling for socio-demographic variables.

It was an explanatory and observational mode of analysis. Since data were gathered at a single point, the study aims not to determine causality but to identify statistically significant relationships between exposure variables (food-related social transfers and socio-demographic characteristics) and the outcome variable (life satisfaction). This methodology aligns with the analysis of large survey data and corresponds with the ethical and methodological principles of analysing secondary observational data.

The analytical methods employed to achieve the research objectives were regression-based. Both a linear regression and a binary logistic regression model were estimated to test life satisfaction as a continuous outcome and a binary outcome, respectively. A combination of the two modelling methods will enable a more in-depth examination of the subject of adolescent life satisfaction and increase the reliability of the results. The use of the Social Determinants of Health framework informed the incorporation of socio-demographic covariates, ensuring that the analytical models considered both structural and household-level aspects, which have been known to affect adolescent life satisfaction.

Moreover, the analytical strategy included the complex sampling design of the MICS survey in a very explicit manner. Stratification, clustering, and sampling weights were employed to ensure the estimates were nationally representative and to perform the appropriate calculations

of standard errors. In general, the selected research design and analytical method were appropriate for addressing the research objectives and producing nationally representative, policy-relevant estimates within the limitations of cross-sectional secondary data.

3.2 Ethical Considerations

The study is based on the secondary analysis of data from the 2019 Bangladesh Multiple Indicator Cluster Survey (MICS), conducted in collaboration between the Bangladesh Bureau of Statistics (BBS) and UNICEF. The original MICS 2019 survey was approved by the Bangladesh Bureau of Statistics and other national bodies prior to data collection, which was conducted with ethical approval. The survey was conducted in accordance with internationally accepted ethical standards for the use of human subjects in research, with special attention given to the rights and well-being of children and adolescents, who are particularly vulnerable. Prior to the survey, informed oral consent was obtained from all adult respondents after they received clear information regarding the purpose and nature of the survey. When the study involved children and adolescents under the age of 18, informed consent was obtained from mothers or primary caregivers, as per the ethical regulations governing the conduct of studies with children. Moreover, adolescents between the ages of 15 and 17 were interviewed directly, and their participation was not forced but rather grounded in their understanding of the survey's purposes. It was explained to the interviewers that the participants had the free will to deny any form of answer to any question asked or leave the interview at any point without being subject to any penalty or negative repercussion.

To further protect the participants, adolescent interviews were conducted privately and in a confidential manner. This strategy reduced the likelihood of parental, guardian, or other family members' influence and contributed to ensuring the responses were based on the personal

opinions and experiences of the adolescents. The level of privacy in the interviews was also a concern because some of the survey's subjects, such as life satisfaction, household conditions, and food security, were sensitive. The role of these measures was to minimise possible discomfort and encourage truthful and sincere answers.

All data obtained in the MICS survey were anonymised and released publicly for use in research. There are no personally identifiable data, names, addresses, or identification numbers included in the dataset of this study, which means that an individual participant cannot be recognised. The anonymised character of the data substantially decreases the risks associated with the lack of confidentiality or the misuse of personal information. Since this study was carried out by analysing new secondary data, which were anonymous, because this study used fully anonymised, publicly available secondary data, it was considered low risk. However, ethical conduct was maintained through responsible data handling, confidentiality, and compliance with university research governance requirements. Nevertheless, the researcher adhered to the ethical aspects of responsible data use, confidentiality, and data protection throughout the research process.

The ethical interpretation and reporting of findings were also given special consideration, particularly given that the study focuses on adolescent girls and involves sensitive factors, including food insecurity and life satisfaction. This was done to ensure that results were presented in an aggregate way to prevent the stigmatisation of individuals, households, or groups of people. The discussion has not employed language that might perpetuate negative stereotypes or blame vulnerable individuals. Rather, the findings were framed within a more general socio-economic and structural framework, which aligns with the Social Determinants of Health framework.

In general, ethical integrity was observed during this study. The rights, dignity, and well-being of the participants were regarded as paramount in all aspects of the research process, including

data handling, analysis, and reporting. By following ethical guidelines of research on secondary data, this research study will ensure that the results provided will add more to the academic literature and policymaking regarding the well-being of adolescents in Bangladesh.

3.3 Study Population and Sample Selection

In line with the research objectives, this study focused on life satisfaction, household food-related social transfers, and key socio-demographic characteristics, including the household wealth index, education of the household head, relationship to the household head, and school attendance.

Data merging was the first step in the analysis process. Both household-level data files were merged with the women's data file. After merging, only adolescent girls aged between 15 and 17 years were extracted based on the research objectives. The final sample was filtered to retain only the relevant variables. After all exclusions, the final sample size was 6,678 adolescent girls.

All the variables were recorded in accordance with the purpose of this study. The responses such as “Don’t know”, “Missing data”, “Not applicable” were treated as System-missing values while making the final sample. The Bangladesh MICS 2019 survey used a two-stage stratified cluster sampling method. The variables Strata, Cluster (Primary Sampling Unit - PSU), and sample weight were used to create the complex sample plan for the data analysis. The original data sample can be downloaded from the MICS website(https://mics.unicef.org/surveys).

3.4 Variables Definition and Preparation

3.4.1 Dependent Variable

Life satisfaction was assessed using the Cantril Ladder, a widely applied global measure of subjective well-being developed by Cantril (1965). The instrument has been adopted in extensive international surveys such as the Gallup World Poll (Deaton, 2008)and UNICEF's Multiple Indicator Cluster Surveys (MICS) (UNICEF, 2019). The Organisation for Economic Co-Operation and Development (OECD) guideline for well-being (2013) also recommends monitoring the individual's well-being. Respondents rate their current life on a scale from 0 (the worst possible life) to 10 (the best possible life).

In this study, life satisfaction was examined in two forms:

1. As a continuous (0–10 scale) variable: Treating the Cantril Ladder as a continuous variable showing the full details of responses and is consistent with its place in large-scale analyses of adolescents and young people, where it has been shown to present valid and sensitive result of life satisfaction(Mohammed & Warner, 2024; Nilsson et al., 2024).
2. As a binary variable, the variable was also divided at the mid-point for policy relevance and ease of interpretation. Melios et al. (2023) classified people who rated their lives as having high life satisfaction. This way of dividing scores is statistically reliable and meaningful for comparing an individual's level of life satisfaction across countries.

Combining both approaches enhances the analysis and, simultaneously, makes the findings more accessible to policymakers, as they align with global well-being studies.

In the 2019 Bangladesh MICS dataset, the Life Satisfaction with Ladder Step variable was coded on a 0–10 scale. For this study, Life satisfaction was treated as both a continuous variable (0–10) and a binary variable, recoded into low satisfaction (0–5) and high satisfaction (6–10).

3.4.2 Exposure and Covariates

Based on previous literature and the Social Determinants of Health (SDH) framework, several socio-demographic covariates were included in this study, as education, household wealth, living environment, and family characteristics are recognised determinants of health and subjective well-being(Chisholm et al., 2010; Marmot et al., 2008; World Health Statistics 2023: Monitoring Health for the SDGs, Sustainable Development Goals, 2023). Accordingly, education of the household head, household wealth index, area of residence (urban/rural), school attendance, sex of household head, relationship to household head, and marital status were included, as these factors have been shown to influence adolescent well-being and life satisfaction in low- and middle-income country contexts (Boraita et al., 2022; Lê-Scherban et al., 2016; Rani & Lule, 2004; Rezaeizadeh et al., 2024)

Food Transfer: The main independent variable of this study was household food-related social transfer. Two indicators were used: (1) the household receipt of any food-related social transfer (yes/no) and (2) timing of the most recent receipt (months ago/ years ago). The primary measure was whether the household had received assistance through a food support programme. For the analysis, this was coded as Yes (1) and No (0), while uncertain or missing responses were excluded.

The timing of food transfer received: This indicates whether assistance was last received months ago (1) or years ago (2). Responses of "don't know" or missing were excluded.

These variables are consistent with global development frameworks, especially in SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being), which emphasise the importance of education, income, and social context in achieving good nutrition and mental health outcomes (United Nations, 2015).

Categorical variables: education of the household head, mother's education, wealth index, area (urban/rural), school attendance, sex of household head, relationship to household head, and marital status.

Continuous variable: age of adolescent girls.

Education of the household head was grouped into primary or below (0) and secondary or higher (1).

Mother's education was grouped into primary or below (0) and secondary or higher (1).

Household wealth index was recategorised into poor (0), middle (1), and rich (2).

The wealth index provided in the MICS 2019 dataset was constructed by the Bangladesh Bureau of Statistics and UNICEF using principal component analysis (PCA) of household asset ownership, dwelling characteristics, and access to utilities, following the standard approach developed for the Demographic and Health Surveys (Rutstein & Johnson, 2004). On this basis, households were originally classified into five national wealth quintiles, from poorest to richest. For the purposes of this study, the five quintiles were recategorised into three groups to simplify interpretation and increase cell sizes for regression analysis: the poorest and second quintiles were combined into 'poor' (0), the middle quintile was retained as 'middle' (1), and the fourth and richest quintiles were combined into 'rich' (2).

Area of residence was coded as urban (1) and rural (0).

School attendance indicated whether the adolescent had attended school: yes (1) or no (0).

The sex of the household head was coded as male (0) and female (1).

Relationship to household head was categorised as biological (1), including son/daughter, grandchild, parent, sibling, uncle/aunt, or niece/nephew, and other (0) for all other relationships.

Marital status was recoded as married (1) and not married (0).

Age was retained as a continuous variable, restricted to adolescents aged 15–17 years.

The education of the household head was used as the primary education covariate because it had no missing values; the mother's education was examined in sensitivity analysis.

3.5 Measurement Validity and Reliability

Quantitative research requires measurement validity and reliability to ensure that researchers are confident that the tools employed in the research are appropriate for the concepts being studied and yield consistent results. This study has evaluated the validity and reliability of the main variables based on their theoretical foundation, previous use in the empirical literature, and suitability for use with adolescents in low- and middle-income country settings.

The dependent variable (satisfaction in life) was assessed using the Cantril Ladder, a single-item subjective well-being scale with high usage in cross-national studies. The Cantril Ladder is highly construct valid because it represents a comprehensive cognitive assessment of people's lives, as opposed to their momentary emotional life conditions. Its cross-cultural applicability and comparability can be demonstrated by its popularity in global surveys, such as the Gallup World Poll or the Multiple Indicator Cluster Surveys conducted by UNICEF. Past research has demonstrated that the Cantril Ladder is effective in adolescent groups and is sensitive to socio-economic and environmental variations, thereby validating its effectiveness in subjective well-being (Deaton, 2008; Nilsson et al., 2024).

Even though single-item measures can be rather problematic in terms of reliability, the studies show that global life satisfaction scales like the Cantril Ladder are characterised by a satisfactory test-retest reliability and high levels of correlation with multi-item well-being scales. Single-item instruments are frequently chosen in large-scale surveys because of their simplicity, less burden on the respondents, as well as minimised chances of measurement error

due to survey fatigue. The standardised administration of the life satisfaction question, used within the framework of the MICS survey, further increases reliability as it allows for homogeneous data collection through interviews with respondents in all regions.

The covariates and independent variables used in this study are based on standardised MICS questionnaire modules that have undergone comprehensive pre-testing, translation, and validation processes in various countries. The household wealth index, education of the household head, school attendance, and marital status are typical variables in demographic and public health studies and have demonstrated high levels of content validity in reflecting socioeconomic status and social conditions. The household wealth index, especially, is built based on principal component analysis, which utilises the ownership of assets and the character of housing, and has proven to be a sound proxy for long-term economic conditions in an environment that struggles to measure income.

The categorical variables were found to be reliable, using well-specified response categories and standardised coding processes. Such recoding, as scaling maternal education and the household wealth index to higher categories, was informed by the literature and undertaken with the aim of enhancing the clarity of analysis while maintaining conceptual soundness. Internal validity was also improved by the small age range (15-17 years) used, as it minimised heterogeneity due to developmental differences among the adolescent population.

Overall, the measurement tools employed in this study demonstrate a satisfactory degree of validity and reliability in examining the correlation between household food-related social transfers and life satisfaction among adolescent girls. Although the secondary data and self-reported measures have limitations, the use of internationally validated surveys and standardised data collection procedures contributes to the strength and validity of the results.

As life satisfaction is self-reported, responses may be influenced by social desirability bias and current mood; however, standardised administration and the established cross-cultural use of the Cantril Ladder support its suitability for comparative analysis.

3.6 Statistical Analysis

The statistical analyses of this research were conducted using IBM SPSS Statistics version 30. All data cleaning, merging procedures, and statistical analysis were done by this software. Descriptive analysis, regression analysis, chi-square tests/ crosstabs, interaction effects, and sensitivity analysis were conducted as the main steps of the statistical analysis. The Complex Samples module in SPSS was used for data analysis.

3.6.1 Missing Data Assessment

Missing data were assessed before beginning the regression analysis. The highest levels of missingness were observed from the mother's education (8.5%), while food transfer received had 5.6% missing values. Life satisfaction had only 0.2% missing, and all other covariates showed negligible or no missingness.

To explore whether missingness in mother's education was patterned, a missingness indicator was created and regressed on school attendance, wealth index, and area of residence. No statistically significant associations were observed ($p > 0.01$), suggesting that missingness was not systematically related to these observed predictors. Given the relatively low level of missingness and the lack of association with key observed predictors, missing values were treated as system-missing and excluded from regression models (complete-case analysis). Mother's education was therefore retained for sensitivity analysis rather than the primary model.

3.7 Definition of Study Variables and Analytical Roles

Table 3: Definition of Study Variables and Analytical Roles

Variable Category	Variable Name	Description / Measurement	Coding	Analytical Role
Outcome Variable	Life satisfaction	Self-reported life satisfaction score reported by adolescent girls aged 15–17	Continuous (scale score) and Binary (high vs low)	Dependent variable
Main Exposure	Household food-related social transfer receipt	Household receipt of any food-based social transfer programme	Yes / No	Key independent variable
Exposure Timing	Timing of food transfer receipt	Whether food transfer was received recently or earlier	Categorical	Secondary exposure
Individual factor	Age of adolescent	Age in completed years	Continuous	Control variable
Individual factor	School attendance	Current school attendance status	Yes / No	Control variable
Individual factor	Marital status	Current marital status	Married / Not married	Control variable

Household factor	Wealth index	Wealth index based on asset ownership	Poor / Middle / Rich	Control variable
Household factor	Education of the household head	The highest education level of the household head	Primary or below/ Secondary or higher	Control variable
Household factor	Education of the mother	The highest education level of the mother	Primary or below / Secondary or higher	Control variable
Household factor	Sex of household head	Sex of the household head	Male / Female	Control variable
Household factor	Area of residence	Place of residence	Urban / Rural	Control variable
Household factor	Relationship to household head	Adolescents' relationship to the household head	Biological / Other	Control variable

3.7.1 Descriptive Analysis

Descriptive statistics were performed for all selected and recoded variables, including Life satisfaction, Food transfer received, Timing of food transfer received, Household heads'

education, Mother's education, Wealth index, Area (urban/rural), School attendance, Sex of household head, Age, Relationship to household head, and Marital status.

3.7.2 Linear Regression Analysis

Linear regression was performed with life satisfaction treated as a continuous outcome on the 0–10 scale. The covariates included categorical variables such as food transfer received, household heads' education, wealth index, area (urban/rural), school attendance, sex of the household head, relationship to the household head, marital status, and age (continuous).

3.7.3 Binary Regression Analysis

Binary logistic regression analysis was conducted with life satisfaction as a binary dependent variable, where life satisfaction was recoded into two categories: low satisfaction (0–5) and high satisfaction (6–10). The covariates included food transfer received, household head's education, wealth index, area (urban/rural), school attendance, sex of household head, relationship to household head, and marital status, with age entered as a continuous variable.

3.7.4 Regression Analysis for Food Transfer Recipients Only

A separate dataset was created, including only cases where food transfers had been received. Both linear and binary regression analyses were repeated for this new dataset, following the same procedures as described in sections 3.7.2 and 3.7.3. In these models, "Food transfer received" was replaced with "Timing of food transfer received" as the main predictor.

3.7.5 Sensitivity Analysis

A sensitivity analysis was conducted by replacing the “Household’s education” variable with the “Mother’s education” variable. The regression analyses (linear and binary) were repeated using this mother’s education variable.

3.7.6 Chi-square Tests/ Crosstabs

Chi-square tests and cross-tabulations were used to compare the socio-demographic characteristics of households that received food transfers with those that did not. Variables compared included the education of the household head, wealth index, area (urban/rural), school attendance, sex of the household head, relationship to the household head, and marital status. All analyses were conducted with the Complex Samples files.

3.7.7 Interaction Effects

This interaction analysis was undertaken to further address the study’s research question of whether household receipt of food-related social transfers is associated with self-reported life satisfaction among adolescent girls after adjusting for potential confounders such as household wealth and education. Testing for interaction effects provided an additional check on this adjusted association, establishing whether it held consistently across socio-demographic subgroups or was instead confined to particular groups of adolescent girls. Besides testing the primary effects of receiving food-related social transfers on the level of life satisfaction among adolescents by household, interaction effects were also examined to determine whether this relationship varied among different socio-demographic subgroups. The relevance of interaction analysis lies in the framework of the Social Determinants of Health (SDH), which highlights that the interaction of various factors at the social, economic, and household levels determines

the outcome of health and well-being, rather than individual exposures. The interaction terms can thus be tested to provide a more nuanced insight into how food-related social transfers differ in relation to household conditions and individual characteristics.

The interaction effects were also investigated in the context of the main regression models, where interaction terms between household food transfer receipt and chosen socio-demographic variables were introduced. These variables have been selected based on previous empirical data and theoretical applicability, as they have been established to have an impact on the well-being of adolescents and can shape the potential effects of social protection programmes. Household wealth, parental education and school attendance have each been shown to moderate the relationship between household-level support and adolescent well-being (Boraita et al., 2022; Chisholm et al., 2010; Lê-Scherban et al., 2016; Marmot et al., 2008; Rani & Lule, 2004; Rezaeizadeh et al., 2024), while area of residence, sex of the household head, relationship to the household head and marital status were included as interaction terms because they capture structural and gendered dimensions of household power and resource allocation identified within the Social Determinants of Health framework as relevant to how support reaches and benefits individual household members. All interaction terms were applied individually to prevent multicollinearity and to provide a clear interpretation of the results.

The interaction terms which were considered in the analysis were: food transfer receipt and education of the household head, food transfer receipt and household wealth index, food transfer receipt and area of residence (urban or rural), food transfer receipt and school attendance status, food transfer receipt and sex of the household head, food transfer receipt and relationship with the house head, and food transfer receipt and marital status of the adolescent. These variables represent the major dimensions of the socio-economic status, school environment, family composition and gender interaction, which are the main elements of the SDH framework.

Using these terms of interaction, the analysis examined whether the relationship between food-related social transfers and life satisfaction differed among subgroups of adolescent girls. Indicatively, interaction analysis enabled the testing of the claim that food transfers were related to life satisfaction among girls in poorer households more so than among wealthier households, and among girls attending school more so than those not attending school. Similarly, the possibility of testing interactions between the education of the household head level and the head of the household's sex allowed for exploring whether parental education and household structure of power influenced the relationships between food assistance and adolescent well-being.

Complex-sample regression was used to estimate all interaction models, taking into consideration the stratified cluster design and the sampling weights of the MICS survey. Interaction terms were analysed using statistical significance at the conventional levels of confidence. In cases where the interaction terms were not significant, it was shown that there was no significant difference in the relationship between food transfer receipt and life satisfaction between the analysed subgroups. On the other hand, significant interaction effects were observed, implying that there may have been heterogeneity in the association, which could be further interpreted.

Overall, the element of interaction effects enhanced the method of analysis in the study, as it does not rely solely on average effects but can help identify patterns within subgroups. This analysis considers the SDH framework and helps to make the findings more relevant to policy by stating that some groups of adolescent girls can benefit from food-related social protection programmes.

4 Results

In this chapter, the author presents the results of analysing secondary data, based on the study's research objectives. The findings are concerned with how self-reported life satisfaction is distributed with respect to adolescent girls aged 15–17 years, how often households receive social transfers related to food and household receipt of social transfers, socio-demographic characteristics of the target population, and the relationship between household receipt of social transfers and self-reported life satisfaction at control for the relevant socio-demographic factors.

The final analytical sample of 6,678 adolescent girls aged 15–17 years was used.

4.1 Sample Characteristics (Research Questions 1 and 2)

This section addresses Research Question 1 (the prevalence of self-reported life satisfaction among adolescent girls aged 15–17 in Bangladesh) and part of Research Question 2 (the socio-demographic characteristics of households with adolescent girls). Table 3 and Table 4, presented below, report these findings.

The socio-demographic characteristics of the study sample and the distribution of life satisfaction are presented on this subsection. Descriptive statistics were generated using the Complex Samples module in IBM SPSS by specifying the survey design through a complex sample plan file. This approach accounted for the two-stage stratified cluster sampling design of the Bangladesh MICS 2019 survey and incorporated sampling weights, strata, and primary sampling units to produce nationally representative estimates.

The final analytical sample included 6,678 adolescent girls aged 15–17 years. Life satisfaction was measured using the Cantril Ladder, with scores ranging from 0 to 10. Overall, a higher

proportion of adolescent girls reported life satisfaction scores in the upper range of the scale compared with the lower range. For analytical purposes, life satisfaction was recoded into a binary variable, with scores of 0–5 classified as low life satisfaction and scores of 6–10 classified as high life satisfaction.

Tables and 5 summarise the socio-demographic attributes of the study population, including life satisfaction, receipt of food-related social transfers by the household, maternal education, household wealth index, area of residence, school attendance, sex of the household head, relationship with the head of the household, marital status, and age. The reasons behind the choice of these variables were the study objectives and the Social Determinants of Health framework. Weighted percentages are reported. The missing data were minimal on the majority of the variables. The weighted mean life satisfaction score was 6.11 (SD = 2.38); the unweighted mean was 6.14 (SD = 2.37). The mean age of respondents was 15.92 years (SD = 0.81), both weighted and unweighted.

Table 4: Socio-Demographic Characteristics of Adolescent Girls Aged 15–17 Years, Bangladesh MICS 2019 (Weighted)

Variable	**Category**	**%**
Life satisfaction (binary)	Low (0–5)	45.6
	High (6–10)	54.4
Household food transfer received	No	86.9
	Yes	13.1
Mother’s education	Primary or below	64.5

	Secondary or higher	35.5
Household wealth index	Poor	36.7
	Middle	21.9
	Rich	41.4
Area of residence	Rural	79.0
	Urban	21.0
School attendance (ever attended)	No	1.2
	Yes	98.8
Age (years)	Mean (SD)	15.92 (0.81)

Table 5: Socio-Demographic Characteristics of Adolescent Girls Aged 15–17 Years, Bangladesh MICS 2019 (Unweighted)

Variable	**Category / Statistic**	**Frequency (n)**	**Percentage (%)**
Life satisfaction (continuous)	Mean (SD)	6.14 (2.37)	—
Life satisfaction (binary)	Low (0–5)	3,041	45.6
	High (6–10)	3,625	54.4
Household food transfer received	No	5,373	85.2
	Yes	930	14.8

Mother's education	Primary or below	3,973	65.0
	Secondary or higher	2,140	35.0
Household wealth index	Poor	2,745	41.1
	Middle	1,506	22.6
	Rich	2,427	36.3
Area of residence	Rural	5,452	81.6
	Urban	1,226	18.4
School attendance	No	88	1.3
	Yes	6,590	98.7
Sex of household head	Male	5,937	88.9
	Female	741	11.1
Age (years)	Mean (SD)	15.92 (0.81)	—
Relationship with household head	Biological	5,727	85.8
	Others	951	14.2
Marital status	Unmarried	5,655	84.7
	Married	1,023	15.3

Note. Valid n = 6,666; 12 cases had missing life-satisfaction data.

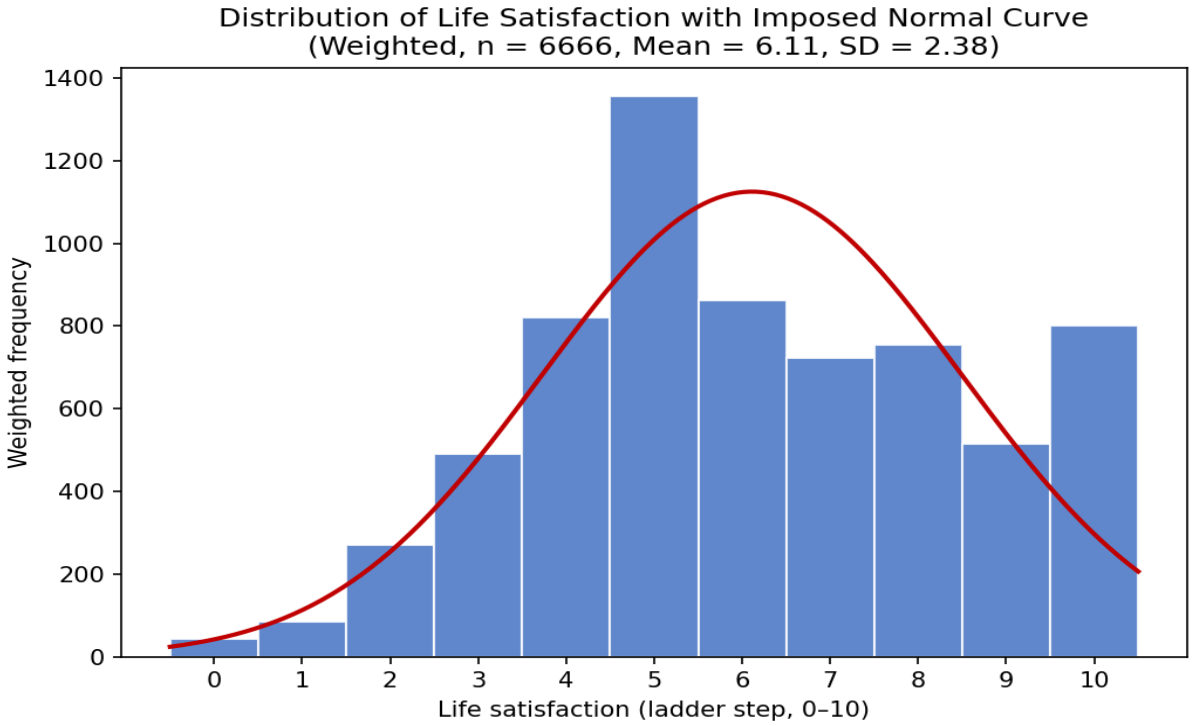


Figure 2: Distribution of Life Satisfaction (0–10 Ladder Step) with Imposed Normal Curve, Weighted (n = 6,666; Mean = 6.11, SD = 2.38), Bangladesh MICS 2019

4.2 MCAR Test Results for Mother's Education

Table 6: Logistic Regression Results for the MCAR Test of Mother's Education

Predictor	**B**	**SE**	**Wald χ^2**	**p-value**	**OR (Exp(B))**
Area (urban)	0.101	0.123	0.669	0.413	1.106
Education of household head (secondary/higher)	-0.037	0.100	0.140	0.709	0.963
School attendance (yes)	0.058	0.399	0.021	0.884	1.060
Wealth index: Second	0.193	0.137	1.972	0.160	1.213

Wealth index: Middle	0.139	0.139	1.009	0.315	1.149
Wealth index: Fourth	-0.058	0.150	0.147	0.702	0.944
Wealth index: Richest	0.029	0.169	0.029	0.864	1.029
Constant	-2.516	0.399	39.873	<0.001	0.081

Of all variables included in the analysis, maternal education had the highest proportion of missing values, while missing data for other variables were minimal. Given the importance of maternal education for adolescent life satisfaction, an assessment was conducted to examine whether missing data on this variable could introduce bias in the regression analyses.

A binary indicator of missingness was created for maternal education, where 0 indicated observed data and 1 indicated missing data. A binary logistic regression model was then estimated, with the missingness indicator as the dependent variable and selected socio-demographic variables as predictors, based on their theoretical relevance to education and socio-economic status.

The omnibus test of model coefficients was not statistically significant ($\chi^2 = 5.085$, $p = 0.650$), indicating that the observed covariates included in the model did not predict missingness in maternal education. In addition, none of the individual predictors were statistically significant (Table 6).

Overall, there was no evidence that missingness in maternal education was systematically associated with the observed socio-demographic variables included in the model. Given the relatively low proportion of missing values, cases with missing maternal education were treated as system-missing and excluded from models using maternal education through complete-case analysis. In general, the MCAR test proves that the validity and strength of the analytical findings provided in subsequent sections of this chapter are not affected by the omission of cases where maternal education data are missing.

Table 7: Omnibus Tests of Model Coefficients

	Chi-square	**P value**
Step	5.085	0.650
Block	5.085	0.650
Model	5.085	0.650

4.3 Bivariate Association between Household Food-Related Social Transfers and Life Satisfaction (Research Question 3)

Table 8: Bivariate Association between Household Food-Related Social Transfers and Life Satisfaction

Household food-related social transfer	**Low life satisfaction (0–5) %**	**High life satisfaction (6–10) %**	**Total (%)**	**p-value**
No	45.6	54.4	100.0	

Yes	47.8	52.2	100.0	
Total	45.6	54.4	100.0	Adjusted F(1, 2638) = 20.141, p < .001

This section begins to address Research Question 3 (whether household receipt of food-related social transfers is associated with self-reported life satisfaction among adolescent girls) by first examining the unadjusted, bivariate relationship, reported in Table 8, before the adjusted regression models are presented in the following section.

This study presents an analysis of the bivariate relationship between households receiving social transfers related to food and self-reported life satisfaction among adolescent girls in Bangladesh (aged 15-17 years). Life satisfaction was assessed through the Cantril Ladder scale and was recoded into a binary outcome to be used with this analysis, which looked at the difference between low life satisfaction (scores 0–5) and high life satisfaction (scores 6-10). This classification aligns with previous well-being studies, making it easier to interpret variations in life satisfaction across groups.

The complicated survey design of the Bangladesh MICS 2019 was completely considered during the analysis to achieve nationally representative and unbiased estimates. The Complex Samples module in IBM SPSS generated weighted cross-tabulations with sampling weights, stratification and clustering. The method corrects for the inequality in selection probability and provides accurate estimates at the population level. The correlation between social transfer receipt in the household and food and life satisfaction among adolescents was determined using

a Rao-Scott adjusted chi-square test, which is suitable for categorical variables obtained from complex survey data.

Table 8 presents the segmentation of life satisfaction levels among adolescent girls based on their household food-related social transfer position. The table compares the percentage of girls who reported low and high life satisfaction in households that received social transfers of food and those that did not. The Rao-Scott chi-square test revealed a statistically significant association between household receipt of food-related social transfers and adolescent life satisfaction at the 5% level of significance (Adjusted $F(1, 2638) = 20.141$, $p < .001$). Because the Bangladesh MICS 2019 uses a stratified, clustered, and weighted complex survey design, statistical inference was based on the Rao–Scott design-adjusted test from the SPSS Complex Samples procedure. This is reported as an Adjusted F statistic, which accounts for the complex survey design; therefore, the Adjusted F statistic is reported throughout these analyses rather than the unadjusted Pearson chi-square statistic. This implies that when the life satisfaction among adolescent girls was considered at the bivariate level, there was a statistically significant association between the receipt of food-related social assistance and reported life satisfaction.

The presence of a statistically significant bivariate association suggests that food-related social transfers may not necessarily reflect a direct impact on the life satisfaction of adolescents. It may be that this association is confounded by other socio-demographic variables, including household wealth, parental education, or educational levels at school. Additionally, households that receive social transfers related to food are usually the most socio-economically disadvantaged, which may account for the observed association with perceived life satisfaction.

Although the bivariate analysis indicates a statistically significant association between food-related social transfers and life satisfaction, it plays a significant role in exploration. These

results suggest that further multivariate analysis should be conducted to control for confounding variables and investigate whether the association changes when primary socio-economic and demographic variables are considered. The findings of this section, therefore, support informed decisions and corroborate the regression analysis results presented in the subsequent sections of this chapter.

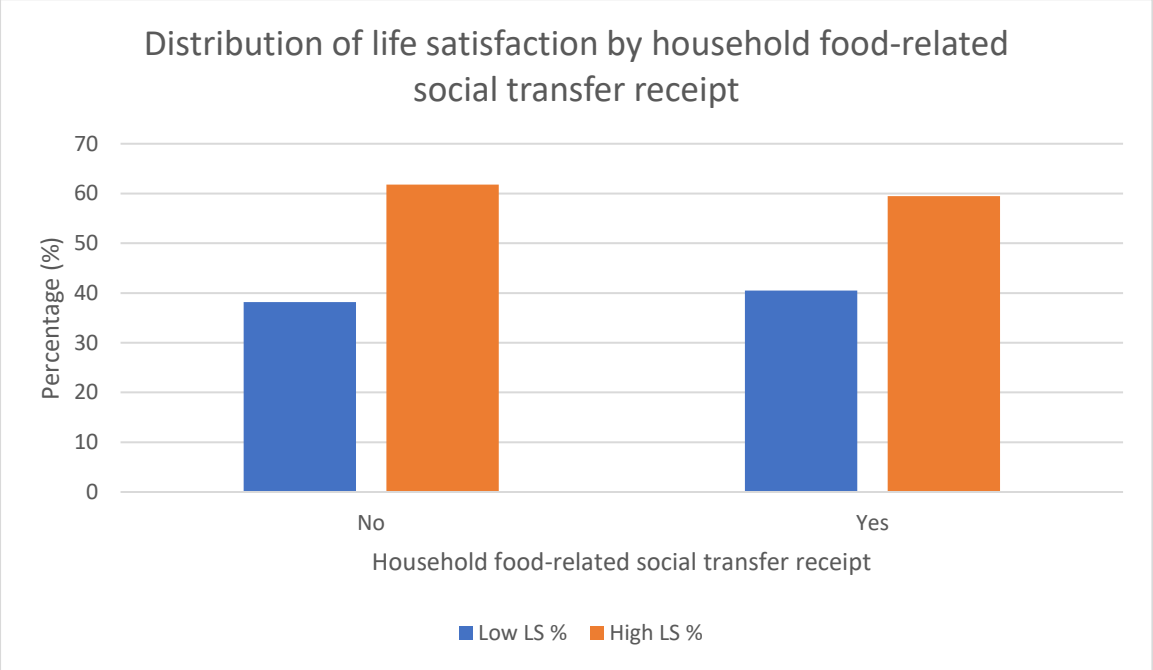


Figure 3: Distribution of life satisfaction by household food-related social transfer receipt

Figure 3 illustrates the weighted distribution of low and high life satisfaction among adolescent girls aged 15-17 years, by household receipt of food-related social transfers. As indicated in the figure, the percentage of adolescents who have high levels of life satisfaction is generally comparable across households that have received food-related social transfers and those that have not. Although it is possible to observe slight variations in how life satisfaction is distributed between the two groups, these differences are statistically significant. This visual image aligns with the results of the Rao-Scott-adjusted chi-square test, which revealed that the relationship between household food-related social transfer receipt and life satisfaction was statistically significant at the 5% level (Adjusted $F(1, 2638) = 20.141$, $p < .001$).

Comprehensively, there was a statistically significant bivariate association between food-transfer receipt and life satisfaction, which supports the idea of conducting a follow-up study with multivariate regression analysis.

4.4 Regression Analysis (Research Question 3)

This section addresses Research Question 3 directly, examining whether household receipt of food-related social transfers is associated with self-reported life satisfaction among adolescent girls after adjusting for potential confounders such as household wealth and education, as reported in the regression tables that follow.

To validate the model estimates, the assumptions of the linear regression were verified before the regression analysis could be carried out. The continuous predictors were found to be linearly related to life satisfaction, as indicated by visual inspection of the scatterplot. Normal probability plot and histogram were used to assess the normality of the residuals, and they showed a nearly normal distribution. The residual plots were used to test homoscedasticity and did not reveal any heteroscedasticity. Multicollinearity was checked using variance inflation factors (VIF), and all values were lower than the generally accepted threshold, indicating no issue with multicollinearity. The Durbin-Watson statistic was used to determine if there was independence of errors, and it indicated that there was no autocorrelation. Generally, the regression assumptions have been met sufficiently.

4.4.1 Regression Analysis: Continuous Life Satisfaction and Food Transfer Receipt

This part will give an account of the findings of the linear regression analysis on the relationship between life satisfaction (as a continuous variable) and household food transfer receipt among

adolescent girls aged between 15 and 17 years, after taking into consideration the covariates (socio-demographic factors) that are relevant.

Life satisfaction did not have a significant relationship with the receipt of household food transfers. The overall model was statistically significant, $F(10, 2553) = 32.78$, $p < .001$, $R^2 = .066$. Although adolescents in households that did not receive social transfers related to food had marginally higher scores on life satisfaction, this difference was not statistically significant ($B = 0.175$, $p = 0.083$).

Several socio-demographic factors were found to be significantly related to life satisfaction. Adolescents whose mothers had a primary education or less education registered significantly lower scores on life satisfaction than those whose mothers had a secondary education or higher ($B = -0.56$, $p < 0.001$). Another strong predictor was household wealth, and adolescents in middle- and high-income households reported better life satisfaction than those in low-income households. There was a positive correlation between life satisfaction and school attendance, indicating that adolescents who attend school reported higher life satisfaction than those who do not attend school.

In the adjusted model, area of residence and sex of the household head were also significant predictors of life satisfaction, whereas relationship to the household head, marital status, and age were not statistically significant.

Table 9: Regression Results Predicting Continuous Life Satisfaction

Predictor	B	SE	95% CI Lower	95% CI Upper	T	p-value

Food transfer received (No)	0.175	0.101	-0.023	0.373	1.731	0.083
Mother's education (Primary/below)	-0.558	0.076	-0.707	-0.409	-7.333	<0.001
Wealth index (Poor)	-0.973	0.091	-1.152	-0.794	-10.668	<0.001
Wealth index (Middle)	-0.546	0.097	-0.735	-0.356	-5.644	<0.001
Area (Rural)	0.219	0.101	0.020	0.418	2.162	0.031
School attendance (No)	-1.723	0.317	-2.345	-1.101	-5.428	<0.001
Sex of household head (Male)	0.238	0.116	0.012	0.465	2.063	0.039
Relationship to household head (Others)	0.205	0.208	-0.204	0.613	0.981	0.327
Marital status (Not married)	0.031	0.207	-0.375	0.438	0.151	0.880
Age of adolescence (continuous)	-0.050	0.040	-0.128	0.028	-1.245	0.213

Reference categories: Received food transfer = Yes; Mother's education = Secondary or higher; Wealth = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship to household head = Biological; Marital status = Married.

4.4.2 Regression Analysis – Binary Life Satisfaction with Food Transfer Receipt

This analysis examined whether household food-transfer receipt was associated with the likelihood of high life satisfaction after adjustment for relevant socio-demographic and household factors. A binary logistic regression model was fitted to examine the socio-demographic and household factors associated with high life satisfaction among adolescents, using the same set of covariates as the continuous model. The overall model was statistically significant, Wald $F(10, 2553) = 19.56$, $p < .001$, Nagelkerke $R^2 = .059$, indicating that the predictors jointly accounted for a significant proportion of the variation in the binary life satisfaction outcome. Household head's education, household wealth, school attendance, and sex of the household head were significant predictors. Adolescents whose household head had primary education or below had lower odds of high life satisfaction than those whose household head had secondary or higher education (OR = 0.67, $p < .001$). Adolescents from poor (OR = 0.48, $p < .001$) and middle-wealth (OR = 0.63, $p < .001$) households were also less likely to report high life satisfaction than those from rich households. Adolescents who did not attend school had lower odds of high life satisfaction than those who attended school (OR = 0.37, $p = .002$), whereas adolescents living in male-headed households had higher odds of reporting high life satisfaction than those in female-headed households (OR = 1.21, $p = .039$). Household food transfer receipt and the remaining covariates were not significantly associated with life satisfaction in this model.

Nevertheless, there were some differences between the two methods of analysis. Area of residence was significantly associated with life satisfaction in the continuous model, with adolescents in rural areas reporting higher life satisfaction than those in urban areas (B = 0.219, p = .031), but it was not a significant predictor in the binary logistic regression model (p = .163). Receipt of food transfers, by contrast, was not significantly associated with life satisfaction in either the continuous model (p = .083) or the binary logistic regression model (p = .506) once socio-demographic variables were accounted for.

Table 10: Binary Logistic Regression Results Predicting High Life Satisfaction

Predictor	B	SE	T	df	p-value	Exp(B)	95% CI Lower (Exp(B))	95% CI Upper (Exp(B))
Food transfer received (No)	0.060	0.090	0.665	2562	0.506	1.062	0.889	1.268
Household head's education (Primary/below)	-0.401	0.068	-5.866	2562	<0.001	0.670	0.586	0.766
Wealth index (Poor)	-0.735	0.082	-8.991	2562	<0.001	0.480	0.409	0.563

Wealth index (Middle)	-0.464	0.086	-5.424	2562	<0.001	0.629	0.532	0.744
Area (Rural)	0.124	0.089	1.395	2562	0.163	1.132	0.951	1.348
School attendance (No)	-1.007	0.319	-3.157	2562	0.002	0.365	0.196	0.683
Sex of household head (Male)	0.194	0.094	2.065	2562	0.039	1.214	1.010	1.459
Relationship to household head (Others)	0.176	0.194	0.907	2562	0.364	1.192	0.815	1.742
Marital status (Not married)	-0.035	0.187	-0.188	2562	0.851	0.965	0.669	1.394
Age of adolescents	-0.034	0.035	-0.960	2562	0.337	0.967	0.902	1.036

Reference categories: Received food transfer = Yes; Household head's education = Secondary or higher; Wealth = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship to household head = Biological; Marital status = Married.

4.4.3 Regression Analysis - Continuous Life Satisfaction with Timing of food transfer received.

In this section, the analysis was conducted to examine the association between adolescent girls' life satisfaction and the timing of food-related social transfers received. Life satisfaction of adolescent girls was used as a continuous variable, with a mean life satisfaction score of 5.58 out of 10 for these adolescent girls. This section will examine the correlation between the satisfaction of adolescent girls in life and the timing of food-related social transfers among households that reported receiving food assistance. Only the food transfer recipients were analysed, and it became possible to evaluate whether the recency of support correlated with the variation in life satisfaction outcomes.

The receipt of food transfers was divided into two groups depending on the latest time of receiving assistance: (1) the last months of receiving assistance and (2) the years ago at receiving assistance. This classification enabled the distinction between exposure to food assistance in the more recent and more distant past, based on the presumption that more recent assistance would be more strongly related to present life satisfaction.

Life satisfaction was considered a continuous variable during this analysis. The average score on life satisfaction among adolescent females in families receiving food-related social transfers was 5.58 out of 10, indicating that this subgroup has moderate levels of life satisfaction.

The regression tests revealed that the time of food transfer receipt did not have any statistically significant relationship with life satisfaction ($B = 0.125$, $p = 0.504$). The overall model was statistically significant, Wald $F(10, 596) = 8.62$, $p < .001$, $R^2 = .084$. This suggests that adolescent girls in households that had recently received food assistance did not report

significantly different life satisfaction scores compared to those in households that had received food transfers a few years prior.

Conversely, several socio-demographic factors were significant predictors of life satisfaction in this subgroup. The education level of the household head was significantly related to the life satisfaction of the adolescent girls. Adolescents from families where the head of the household had primary education or less were significantly less satisfied with life than those from families where the head of the household had secondary education or higher. The results of this finding suggest that wider structural factors, including education and socioeconomic status, can contribute more to adolescent life satisfaction than the timing of food-related social transfers alone.

The education level of the household head had a significant relationship with the life satisfaction of girls. Adolescents' household heads with a primary or below education level had 1.07 points lower life satisfaction than adolescents' household heads with secondary or higher education.

The wealth index of these households also had a strong and significant connection with the life satisfaction of adolescent girls. The poorest households reported 0.84 points lower life satisfaction than richer households. And the result was statistically significant ($p = 0.002$). The middle-income households also reported 0.19 points lower life satisfaction than richer households. However, this difference was not statistically significant ($p = 0.525$).

School attendance had a significant relationship with the life satisfaction of adolescent girls. Adolescents who never attended school had 1.29 points lower life satisfaction than those who attended school ($p < .001$).

The sex of the household head also had a significant relationship with the life satisfaction of the girls (p = 0.023). Adolescents with male household heads had 0.72 points higher life satisfaction than adolescents with female household heads.

The area of residence (urban/rural), relationship to the household head, marital status, and age of the girls were not statistically significant in relation to the life satisfaction of adolescent girls. (p=0.925, p=0.109, p=0.290, p=0.158).

Overall, adolescents from rich households compared with poor households, those with male household heads, households with secondary or higher levels of education, and adolescents who attended school had significantly greater life satisfaction than their counterparts.

Table 11: Complex Samples General Linear Model Results Predicting Continuous Life Satisfaction with Timing of Food Transfer Receipt

Predictor	B	SE	95% CI Lower	95% CI Upper	t	df	p-value
Timing of food transfer received (Months ago)	0.125	0.187	-0.243	0.493	0.668	605	0.504
Education of household head (Primary/below)	-1.069	0.220	-1.501	-0.637	-4.858	605	<0.001
Wealth index (Poor)	-0.844	0.266	-1.366	-0.322	-3.177	605	0.002
Wealth index (Middle)	-0.189	0.297	-0.773	0.394	-0.637	605	0.525
Area (Rural)	0.018	0.193	-0.361	0.397	0.094	605	0.925

School attendance (No)	-1.287	0.350	-1.975	-0.599	-3.673	605	<0.001
Sex of household head (Male)	0.722	0.317	0.099	1.344	2.278	605	0.023
Relationship to household head (Others)	0.700	0.436	-0.156	1.555	1.605	605	0.109
Marital status (Not married)	-0.440	0.415	-1.255	0.375	-1.059	605	0.290
Age of adolescents	0.143	0.101	-0.056	0.341	1.412	605	0.158

Reference categories: Timing of food transfer = Years ago; Education = Secondary or higher; Wealth = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship to household head = Biological; Marital status = Married.

4.4.4 Regression Analysis – Binary Life Satisfaction with Timing of Food Transfer Received

This section presents the results of the association between the life satisfaction of adolescent girls and the timing of food-related social transfers received, as well as other socio-demographic characteristics.

The model predicted the odds of high life satisfaction (6–10) relative to low life satisfaction (0–5). Overall, the timing of food-related social transfer receipt was not significantly associated with high life satisfaction. Household head education, household wealth, and sex of the household head were significantly associated with life satisfaction in this subgroup, while

school attendance showed a marginal, non-significant association. Area of residence, relationship to the household head, marital status, and age were not statistically significant.

The timing of food-related social transfer receipt showed a positive but non-significant association with high life satisfaction. Compared with girls who received food transfers years ago, those who received transfers more recently had 38% higher odds of reporting high life satisfaction (OR = 1.38, 95% CI: 0.98–1.95), although this association did not reach statistical significance (B = 0.322, p = 0.066). This direction is consistent with the continuous life-satisfaction model (Table 11), in which more recent receipt was similarly, though non-significantly, associated with higher life satisfaction scores (B = 0.125, p = 0.504), confirming that the two models no longer show opposing directions of association.

Household head education was the strongest predictor in this model. Adolescents from households where the head had primary or below education had significantly lower odds of high life satisfaction than those from households where the head had secondary or higher education, with 55% lower odds among the primary-or-below group (OR = 0.45, $p < 0.001$).

When comparing the wealth of households, adolescents from poor households had significantly lower odds of high life satisfaction than adolescents from rich households, with 46% lower odds among the poor group (OR = 0.54, p = 0.041).

School attendance among girls showed a marginal, non-significant association with their life satisfaction at the 5% level. Adolescents who never attended school had 75% lower odds of high life satisfaction than adolescents who attended school, although this association did not reach conventional statistical significance (OR = 0.25, p = 0.058).

The sex of the household head was significantly associated with the life satisfaction of adolescent girls. Adolescents from a household headed by a male had 83% higher odds of high life satisfaction than those from a household headed by a female (OR = 1.83, p = 0.043).

The area of residence (urban/rural), relationship to the household head, marital status, and age of the adolescent girls were not statistically significant in predicting their life satisfaction. (p=0.583, p=0.294, p=0.169, p=0.385)

Overall household-head education, household wealth, and sex of the household head were statistically significantly associated with high life satisfaction. School attendance showed a marginal but non-significant association, while timing of food-transfer receipt, area of residence, relationship to the household head, marital status, and age were not statistically significant.

Table 12: Complex Samples Logistic Regression Results Predicting High Life Satisfaction with Timing of Food Transfer Receipt

Predictor	B	SE	95% CI Lower	95% CI Upper	T	df	p-value	Exp(B)
Timing of food transfer received (Months ago)	0.322	0.175	-0.021	0.665	1.841	608	0.066	1.380
Education of household head (Primary/below)	-0.790	0.206	-1.194	-0.386	-3.840	608	<0.001	0.454

Wealth index (Poor)	-0.610	0.298	-1.196	-0.025	-2.046	608	0.041	0.543
Wealth index (Middle)	-0.126	0.325	-0.764	0.513	-0.387	608	0.699	0.882
Area (Rural)	0.115	0.209	-0.296	0.526	0.550	608	0.583	1.122
School attendance (No)	-1.373	0.724	-2.794	0.048	-1.897	608	0.058	0.253
Sex of household head (Male)	0.604	0.297	0.020	1.188	2.032	608	0.043	1.830
Relationship to household head (Others)	0.565	0.538	-0.491	1.622	1.051	608	0.294	1.760
Marital status (Not married)	-0.697	0.507	-1.692	0.298	-1.376	608	0.169	0.498
Age of adolescents	0.080	0.092	-0.101	0.261	0.869	608	0.385	1.083

Reference categories: Timing of food transfer = Years ago; Education = Secondary or higher; Wealth = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship to household head = Biological; Marital status = Married.

4.5 Sensitivity Analysis (Research Question 3 – Robustness Check)

Sensitivity analysis was conducted to strengthen the primary regression analysis. In the main analysis, the education of household heads was used as a key predictor. During the sensitivity

analysis, household heads' education was replaced by the mothers' education. This allowed us to assess whether the previous effects on life satisfaction were consistent or not when using different measures of household educational status.

4.5.1 Regression Analysis - Continuous Life Satisfaction with Food Transfer Receipt

The average score of adolescent girls concerning life satisfaction in this analytical sample was 6.12 out of 10. The small deviation compared to earlier reported mean values is an indication of a difference in the analytical sample resulting from the listwise deletion of missing observations used in the regression model. The receipt of household food-related social transfers was statistically non-significantly linked with the life satisfaction of adolescent girls. Young people in families that did not receive food-related social transfers had slightly higher life satisfaction scores compared to young people in families that received food assistance; although this difference was not statistically significant ($B = 0.187$, $p = 0.074$). The overall model was statistically significant, $F(10, 2460) = 31.99$, $p < .001$, $R^2 = .068$. The mother's education had a significant relationship with the life satisfaction of the adolescent girls. Adolescent girls whose mothers had less than secondary education or higher education reported significantly lower levels of life satisfaction compared to adolescent girls whose mothers had secondary education or higher ($B = -0.622$, $p < 0.001$). Other socio-demographic characteristics, which were incorporated in the model, did not display significant relationships with life satisfaction.

Mothers' education was statistically significant for the life satisfaction of adolescent girls. Adolescents with a primary or lower education level had 0.62 points lower life satisfaction than adolescents from mothers with secondary or higher education ($B = -0.622$, $p < 0.001$).

Household wealth also had a significant relationship with the life satisfaction of adolescents. Girls from the poorest households had 0.93 points lower life satisfaction than girls from the richest households. (B=-0.929, p<0.001). Girls from middle-income households had 0.51 points lower life satisfaction than girls from the richest households. (B=-0.505, p<0.001)

School attendance was significantly associated with the life satisfaction of schoolgirls. Adolescents who never attended school had 1.70 points lower life satisfaction than adolescents who attended school. (B=-1.70, p<0.001)

The sex of the household head was associated with the life satisfaction of schoolgirls. Girls from families with a male household head had 0.25 points higher life satisfaction than adolescents from families with a female household head. (B=0.254, p=0.032)

The area of residence (urban/rural), relationship to the household head, marital status, and age of the adolescent girls were not statistically significant in relation to adolescents' life satisfaction. (p>0.05).

Table 13: Complex Samples General Linear Model Results Predicting Continuous Life Satisfaction with Food Transfer Receipt

Predictor	B	SE	95% CI Lower	95% CI Upper	t	df	p-value
Food transfer received (No)	0.187	0.104	-0.018	0.391	1.788	2469	0.074
Mothers' education (Primary/below)	-0.622	0.078	-0.775	-0.468	-7.952	2469	<0.001

Wealth index (Poor)	-0.929	0.096	-1.118	-0.740	-9.642	2469	<0.001
Wealth index (Middle)	-0.505	0.101	-0.704	-0.306	-4.982	2469	<0.001
Area (Rural)	0.203	0.106	-0.005	0.410	1.916	2469	0.056
School attendance (No)	-1.701	0.345	-2.379	-1.024	-4.926	2469	<0.001
Sex of household head (Male)	0.254	0.119	0.022	0.487	2.145	2469	0.032
Relationship to household head (Others)	0.175	0.242	-0.299	0.649	0.725	2469	0.469
Marital status (Not married)	0.081	0.227	-0.364	0.526	0.356	2469	0.722
Age of adolescents	-0.035	0.042	-0.117	0.047	-0.842	2469	0.400

Reference categories: Food transfer received = Yes; Mothers' education = Secondary or higher; Wealth = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship to household head = Biological; Marital status = Married.

4.5.2 Regression Analysis – Binary Life Satisfaction with Food Transfer Receipt

In this section, life satisfaction is measured as a binary outcome: low satisfaction (0-5) and high satisfaction (6-10). The households' education is used as the main predictor.

Food-related social transfer receipt again showed no significant association with life satisfaction. (OR=1.09, p=0.385) The overall model was statistically significant, Wald F(10, 2460) = 20.11, p < .001, Nagelkerke R^2 = .066.

Mother's education was significantly associated with life satisfaction. Adolescents whose mothers had primary or below education had lower odds of high life satisfaction than adolescents whose mothers had secondary or higher education (OR = 0.591, p < .001).

Household wealth was significantly associated with the life satisfaction of adolescent girls. Adolescents from poor households had lower odds of high life satisfaction than adolescents from rich households (OR = 0.512, p < .001). Adolescents from middle-wealth households also had lower odds of high life satisfaction than adolescents from rich households (OR = 0.661, p < .001).

School attendance was significantly associated with life satisfaction. Adolescents who had never attended school had lower odds of high life satisfaction than adolescents who attended school (OR = 0.385, p = .003).

The sex of the household head was also significantly associated with the life satisfaction of adolescent girls. Adolescents from male-headed households had higher odds of high life satisfaction than adolescents from female-headed households (OR = 1.221, p = .038).

The areas of residence (urban/rural), relationship to the household head, marital status, and age of adolescent girls were not statistically significant in relation to adolescents' life satisfaction. (p>0.05)

Table 14: Complex Samples Logistic Regression Results Predicting High Life Satisfaction with Food Transfer Receipt

Predictor	B	SE	T	df	p-value	OR (Exp(B))	95% CI for OR
Food transfer received (Yes vs No)	0.081	0.094	0.869	2469	0.385	1.085	0.903 – 1.303
Mother's education (Primary/below)	-0.526	0.071	-7.370	2469	<0.001	0.591	0.514 – 0.680
Wealth index (Poor)	-0.669	0.086	-7.791	2469	<0.001	0.512	0.433 – 0.606
Wealth index (Middle)	-0.414	0.089	-4.624	2469	<0.001	0.661	0.555 – 0.788
Area (Rural)	0.115	0.091	1.261	2469	0.207	1.122	0.938 – 1.342
School attendance (No)	-0.954	0.323	-2.955	2469	0.003	0.385	0.205 – 0.725
Sex of household head (Male)	0.200	0.096	2.076	2469	0.038	1.221	1.011 – 1.475
Relationship to household head (Others)	0.087	0.207	0.421	2469	0.674	1.091	0.727 – 1.636
Marital status (Not married)	0.009	0.193	0.047	2469	0.962	1.009	0.691 – 1.474

Age of adolescents	-0.025	0.037	-0.669	2469	0.504	0.975	0.907 – 1.049

Reference categories: Food transfer received = Yes; Mothers' education = Secondary or higher; Wealth = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship to household head = Biological; Marital status = Married.

4.5.3 Regression Analysis - Continuous Life Satisfaction with Timing of food transfer received.

In this section, the sensitivity analysis was done by replacing the food-related social transfer with the timing of the food-related social transfer received. The mean life satisfaction was 5.59 in this model, and life satisfaction was measured as a continuous variable.

Adolescents from households that received food-related social transfer months ago had 0.161 points higher life satisfaction than those who had received food transfer years ago. However, this difference was small and not statistically significant in relation to life satisfaction. (B=0.161, p=0.41) The overall model was statistically significant, $F(10, 557) = 8.83$, $p < .001$, $R^2 = .075$.

Mothers' education was statistically significant in relation to life satisfaction. Adolescents whose mothers had primary or below education were 0.92 points lower in life satisfaction than those whose mothers had secondary or higher education. (B=-0.92, p<0.001)

The wealth of households also showed a significant association. Adolescents from the poorest households had 0.79 points lower levels of high life satisfaction than adolescents from the richest households. (B=-0.78, p<0.001) Adolescents from middle-income households had 0.14 points lower levels of high life satisfaction than those from the richest households, but this difference was not statistically significant in terms of life satisfaction. (B=-0.141, p=0.631)

School attendance had a significant relationship with life satisfaction. Adolescents who had never attended school had 1.09 points lower life satisfaction than those who had attended school. (B=1.099, p<0.001).

The sex of the household head was significantly associated with life satisfaction. Adolescents from male-headed households had 0.76 points higher life satisfaction than those from female-headed households. (B=0.760, p=0.02)

Area of residence, relationship to household head, marital status, and age were not significantly associated with the life satisfaction of adolescent girls.

Table 15: Complex Samples General Linear Model Results Predicting Continuous Life Satisfaction with Timing of Food Transfer Receipt

Predictor	B	SE	95% CI Lower	95% CI Upper	T	p-value
Timing of food transfer received (Months ago)	0.161	0.196	-0.223	0.546	0.824	0.410
Mothers' education (Primary/below)	-0.920	0.235	-1.381	-0.459	-3.922	<0.001
Wealth index (Poor)	-0.790	0.265	-1.310	-0.269	-2.978	0.003
Wealth index (Middle)	-0.141	0.294	-0.719	0.437	-0.480	0.631
Area (Rural)	-0.185	0.196	-0.570	0.200	-0.943	0.346

School attendance (No)	-1.099	0.329	-1.746	-0.452	-3.336	<0.001
Sex of household head (Male)	0.760	0.326	0.119	1.401	2.330	0.020
Relationship to household head (Others)	0.905	0.469	-0.016	1.825	1.931	0.054
Marital status (Not married)	-0.500	0.425	-1.334	0.335	-1.176	0.240
Age of adolescents	0.142	0.104	-0.063	0.347	1.360	0.174

Reference categories: Timing of food transfer = Years ago; Mothers' education = Secondary or higher; Wealth = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship = Biological; Marital status = Married.

4.5.4 Regression Analysis – Binary Life Satisfaction with Timing of Food Transfer Received

Life satisfaction showed a similar pattern during the binary outcome again. Adolescents from households that had received food-related social transfers in the past had higher odds of experiencing high life satisfaction. But this was not statistically significant. (OR=1.37, p=0.079) The overall model was statistically significant, Wald F(10, 560) = 4.47, $p < .001$, Nagelkerke $R^2 = .084$.

Mothers' education showed a similar pattern, which was significantly associated with the life satisfaction of the girls. Adolescents whose mothers had primary or lower education showed

had lower odds of achieving high life satisfaction than those whose mothers had secondary or higher education. (OR=0.444, p<0.001)

The sex of the household also had a significant relationship with the life satisfaction of the girls. Adolescents with male household heads had higher odds of higher life satisfaction than those with female household heads. (OR=1.907, p=0.035)

Household wealth, household area of residence, school attendance, relationship to the household head, marital status, and age of the girls were statistically not significant with the life satisfaction of the adolescent girls. (p>0.05)

Table 16: Complex Samples Logistic Regression Results Predicting High Life Satisfaction with Timing of Food Transfer Receipt

Predictor	B	SE	T	df	p-value	OR (Exp(B))	95% CI for OR
Timing of food transfer (Months ago)	0.318	0.180	1.761	569	0.079	1.374	0.964 – 1.958
Mother's education (Primary/below)	-0.812	0.222	-3.652	569	<0.001	0.444	0.287 – 0.687
Wealth index (Poor)	-0.536	0.298	-1.798	569	0.073	0.585	0.326 – 1.051

Wealth index (Middle)	-0.077	0.325	-0.235	569	0.814	0.926	0.489 – 1.755
Area (Rural)	-0.099	0.207	-0.476	569	0.634	0.906	0.603 – 1.361
School attendance (No)	-1.177	0.702	-1.676	569	0.094	0.308	0.078 – 1.224
Sex of household head (Male)	0.646	0.306	2.110	569	0.035	1.907	1.046 – 3.478
Relationship to household head (Others)	0.589	0.553	1.066	569	0.287	1.803	0.608 – 5.341
Marital status (Not married)	-0.779	0.487	-1.597	569	0.111	0.459	0.176 – 1.196
Age of adolescents	0.093	0.094	0.988	569	0.324	1.097	0.912 – 1.319

Reference categories: Timing = Years ago; Mother's education = Secondary or higher; Wealth index = Rich; Area = Urban; School attendance = Yes; Sex of household head = Female; Relationship = Biological child; Marital status = Married.

The overall results of the primary analysis were the same during the sensitivity analysis. The household food-related social transfer received was not statistically significant in relation to life satisfaction. The timing of household food-related social transfers showed a significant association in only one model, but that effect was also very small. Among other socio-demographic characteristics, such as the mother's education, household wealth, school

attendance, and the sex of the household head, were repeatedly associated with adolescents' life satisfaction.

4.6 Comparison of characteristics of Food and non-food receipt households (Research Question 2)

In this section, the socio-demographic characteristics of adolescent girls aged 15–17 years are compared according to whether their households received food-related social transfers. The purpose of the comparison is to find the systematic differences between food-transfer recipient and non-recipient households, which could be used to contextualise the later regression results. The features that have been studied are the level of education of the leader of the household, the status of wealth of the household, the place of residence, attendance at schools, the sex of the household head, the association of the adolescent girls with the household head, and the marital status of the adolescent girls.

Table 17: Socio-Demographic Characteristics of Adolescents by Household Food Transfer Receipt

Characteristic	No Food Transfer (%)	Yes Food Transfer (%)	p-value (Adjusted F)
Household head education	63% primary or below	82.9% primary or below	$F(1, 2638) = 99.749$, $p < .001$
Household wealth	32.5% poor	71.4% poor	$F(1.977, 5215.722) = 183.480$, $p < .001$

Area of residence	79.9% rural	89.2% rural	$F(1, 2638) = 32.881$, $p < .001$
School attendance	99.1% yes	97.6% yes	$F(1, 2638) = 11.737$, $p < .001$
Sex of household head	88.1% male	89.5% male	$F(1, 2638) = 0.930$, $p = .335$
Relationship to head	85.4% other	86.4% other	$F(1, 2638) = 0.532$, $p = .466$
Marital status	84.4% not married	85.2% not married	$F(1, 2638) = 0.242$, $p = .623$

The Rao-Scott adjusted F tests of independence summarised in Table 17 indicated that household-head education ($F(1, 2638) = 99.749$, $p < .001$), household wealth ($F(1.977, 5215.722) = 183.480$, $p < .001$), area of residence ($F(1, 2638) = 32.881$, $p < .001$), and school attendance ($F(1, 2638) = 11.737$, $p < .001$) differed significantly according to household food transfer receipt, whereas sex of household head ($F(1, 2638) = 0.930$, $p = .335$), relationship to household head ($F(1, 2638) = 0.532$, $p = .466$), and marital status ($F(1, 2638) = 0.242$, $p = .623$) did not.

4.7 Mean Life Satisfaction with Food Transfer Receipt

Mean life satisfaction differed between the two groups that received food transfers and those that did not. Adolescents from households with food transfer receipt reported a mean life

satisfaction of 5.55. (95% CI = 5.36-5.74) Adolescents from households without food transfer receipt reported a mean life satisfaction of 6.18 (95% CI = 6.10-6.25).

The independent sample t-test also showed a significant association with life satisfaction. ($t=7.28$, $p<0.001$) The independent sample's effect size was 0.264 on life satisfaction.

Table 18: Mean Life Satisfaction by Food Transfer Receipt Status

Food Transfer Receipt	Mean Life Satisfaction	Standard Error	95% CI (Lower–Upper)
No	6.18	0.038	6.10 – 6.25
Yes	5.55	0.096	5.36 – 5.74
Total	6.10	0.036	6.03 – 6.16

4.8 Interaction Effects Between Food Transfer Receipt and Socio-Demographic Factors (Research Question 3 – Subgroup Analysis)

Interaction effects were tested to determine whether the correlation between the receipt of household food-related social transfers and the life satisfaction of the adolescent girls varied among the major socio-demographic subgroups. The adjusted regression models were tested with separate interaction terms for each of the following factors: the mother's education, household wealth index, neighbourhood of residence (urban/rural), school education, sex of the household head, relationship of the household head, and marital status.

Seven interaction terms were tested in the binary logistic regression models (adjusted for potential confounders). Two of the seven were statistically significant at the 5% level: food

transfer receipt by mother's education (Wald F(1, 2469) = 8.82, p = .003; B = 0.660, Exp(B) = 1.94, 95% CI 1.25–2.99) and food transfer receipt by marital status (Wald F(1, 2469) = 4.22, p = .040; B = 0.596, Exp(B) = 1.82, 95% CI 1.03–3.21). The remaining five interaction terms were wealth index, area of residence, school attendance, sex of household head, and relationship to household head were not statistically significant ($p > 0.05$). This implies that the association between household food transfer receipt and adolescent life satisfaction did not differ significantly across most socio-demographic subgroups, but did differ significantly by mother's education and by marital status. Full parameter estimates for all seven interaction models are presented in Appendix Table 2; comparable interaction models for the continuous (linear regression) life-satisfaction outcome were not available for inclusion in this analysis.

4.9 Chapter Summary

This chapter presents the findings of a study that explored the relationship between household food-related social transfer receipt and life satisfaction among adolescent girls aged 15–17 years, based on data from the Bangladesh MICS 2019 survey. Descriptive results indicated that approximately fifty per cent of the adolescents expressed a high level of life satisfaction, with food-related social transfers being significantly delivered to households with low educational levels, low affluence, and residing in rural regions.

In continuous regression and binary regression, social transfer receipt on the household food-related aspects did not have a significant correlation with the life satisfaction of adolescent girls after controlling for the socio-demographic variables. The same results were replicated in several modelling methodologies, such as sensitivity analysis that substituted the household head's education with the mother's education, and models that analysed the time at which food transfer was received.

Conversely, socio-demographic variables such as education level, family wealth, attending school, and the sex of the household head were consistently linked to life satisfaction among adolescents. Interaction analyses further showed that the correlation between food transfer receipt and life satisfaction did not differ significantly by household wealth, area of residence, school attendance, or household head characteristics, but did differ significantly by mother's education and by marital status.

Overall, the findings indicate that socio-economic factors were more strongly associated with adolescent life satisfaction than household food-related social transfers. These findings are discussed further in the next chapter.

5 Discussion

5.1 Introduction to Chapter

This chapter presents the most important findings of the study in relation to the research objectives and provides an interpretation of the findings within the framework of the current literature and the Social Determinants of Health (SDH) concept. The primary objective of the research was to assess the levels of self-reported satisfaction in the lives of adolescent girls aged 15-17 years in Bangladesh and to investigate whether the receipt of food-related social transfers in the household correlates with life satisfaction of the adolescents, after considering pertinent socio-demographic factors.

The study is based on nationally representative data from the Bangladesh Multiple Indicator Cluster Survey (MICS) 2019, focusing on adolescent life satisfaction as the outcome. The study has examined the direct and adjusted relationships between food-related social transfers and life satisfaction, while also considering a broader range of socioeconomic and demographic variables, including household education, household wealth, school attendance, area of residence, and characteristics of the household head. They were chosen because of their theoretical applicability to the life satisfaction of adolescents and their alignment with the SDH framework, which emphasises the importance of structural and social conditions in determining health and well-being outcomes.

The discussion begins with a brief overview of the most important findings, summarising the general trends in the life satisfaction levels of adolescent girls and examining the relationships between food-related social transfers and life satisfaction. Special emphasis is on the consistent role of socio-economic factors, such as education, household wealth, and school participation,

in explaining the differences in life satisfaction. The chapter subsequently contextualises these findings within the wider literature on social protection, adolescent well-being, and social determinants of health in the international and regional literature, identifying where the findings align with or differ from prior studies.

Lastly, the chapter concludes by examining the strengths and weaknesses of the research to give a vigorous interpretation of the findings. This will involve respecting the use of secondary data, whether the survey will be cross-sectional or not, and the consequences of these methodological decisions on ensuring causal inference. The conclusion of the discussion provides the background to the next chapter, where the policy and research implications of the findings are identified.

5.2 Summary of Key Findings

This research examines the life satisfaction of young girls aged 15-17 years in Bangladesh, exploring its relationship to household receipt of social transfers and food issues, and considers a set of socio-demographic factors. Overall, the results indicate a moderate level of life satisfaction among adolescent girls in Bangladesh, suggesting that life satisfaction is more strongly associated with structural socio-economic conditions than with the receipt of food-related social assistance alone.

Adolescent girls had an average rating of 6.1 out of 10 on the Cantril Ladder scale for life satisfaction, which places most respondents in the higher half of the scale. This suggests that, although most adolescent girls have positive views of their lives, their quality of life is limited and imbalanced. These results align with other studies carried out in Bangladesh, which have also found moderate levels of life satisfaction among the adolescent population and the general

population (Hasan et al., 2024; Uthso & Akter, 2022). These trends highlight the persistence of socio-economic issues that continue to affect the satisfaction of adolescents with their lives, despite improvements in health and education indicators at the country level.

In most the methods of analysis employed in this study, including multivariable linear regression, logistic regression, sensitivity analysis, subgroup comparison, and interaction analysis, household receipt of food-related social transfers was not found to be a significant predictor of life satisfaction in adolescent girls, once socio-demographic factors were taken into account; a significant bivariate association was observed before adjustment, but this did not persist in the adjusted models. This result was consistent when life satisfaction was modelled as both a continuous and binary variable, when the education of the household head was substituted with maternal education, and when the time of food transfer reception was considered. These reproducible findings suggest that food-related social transfers, although potentially relevant to addressing short-term nutritional needs, are not associated with measurable improvements in the broader life satisfaction of adolescents in this sample.

Conversely, several socio-demographic factors exhibited a consistent relationship with life satisfaction. Adolescent girls from lower educational background families, especially those where the head or mother of the family had less than a primary education, were significantly less satisfied with life. In the same way, household wealth also became one of the most powerful predictors and girls in poorer households had significantly worse life satisfaction than girls in wealthier households. The results are consistent with the existing literature, which highlights the association between education, financial security, and the well-being of adolescents in low- and middle-income countries (Gulema et al., 2024; Hasan et al., 2024).

Attending school was another important factor in life satisfaction. Adolescent girls who never attended school consistently scored lower in all models on life satisfaction. This aligns with earlier studies linking schooling to future economic opportunities as well as psychosocial and societal benefits, and a sense of purpose in adolescence. In the SDH concept, education serves as both a structural determinant and a transmission pathway of social advantage, underscoring its significance in adolescent mental and emotional health.

Life satisfaction was also linked to the sex of the household head, with girls in male-headed households reporting higher life satisfaction compared to those in female-headed households. Although this observation does not necessarily suggest that female-headed households are disadvantaged, it may reflect the existence of larger structural inequalities in Bangladesh, where female-headed households are, in most cases, more economically vulnerable and socially constrained. Other previous studies have reported similar associations when investigating the impact of household structure on adolescent outcomes in South Asian contexts (Chakarvarti, 2022).

Additional study concerning the household traits showed that food transfer-receiving households were more susceptible to a disproportionate extent. Such households were more likely to be poor, less educated, and remain in rural areas, and often contained school-going adolescents. Youngsters from such families also reported reduced mean life satisfaction compared to youths in non-recipient households. This suggests that the absence of a positive association between receiving food transfers and life satisfaction may be linked to structural disadvantage and cumulative deprivation among recipient households, rather than to the food transfers themselves. Food-related transfers may help reduce acute food insecurity, but on their own do not appear sufficient to offset more profound socio-economic disadvantages that shape adolescents' lived experiences and life satisfaction.

Interaction analyses also revealed no significant differences in the association between food transfer receipt and life satisfaction across socio-economic or demographic subgroups, indicating that this lack of association was consistent regardless of education, wealth, residence, schooling, or household structure. Together, this evidence supports the argument that broader social determinants, particularly education and economic position, show a stronger association with adolescent life satisfaction than food-based social transfers considered in isolation.

In general, the findings suggest that policies aiming to improve the future life satisfaction of adolescent girls in Bangladesh may need to consider factors beyond food aid, including structural disparities in education, income, and social support. These findings form a significant basis for the discussion of policy and practice implications, as presented in the subsequent sections.

5.3 Discussion of Findings in Relation to Literature

This study contributes to the existing literature on adolescent life satisfaction in low- and middle-income countries by examining the relationship between household food-related social transfers and life satisfaction among adolescent girls in Bangladesh. The results indicate that, although the girls reported a moderate degree of life satisfaction overall, there was no statistically significant association between food-related social transfers and life satisfaction once socio-demographic variables were taken into account; instead, education, household wealth, school attendance and household composition were the strongest correlates of life satisfaction in this sample. These results are broadly consistent with the current body of empirical studies and align with the Social Determinants of Health (SDH) framework. The following sections discuss these findings in relation to the literature, beginning with the

association between food-related social transfers and life satisfaction, followed by the socio-demographic determinants identified in this study.

5.3.1 Association Between Food-Related Social Transfers and Life Satisfaction

5.3.1.1 No significant association between food transfers and life satisfaction

The results of this study show that there is no significant association between household receipt of food-related social transfers and the life satisfaction of adolescent girls aged 15–17 years in Bangladesh, after adjusting for socio-demographic factors, although a significant unadjusted association was found before this adjustment. This means that receiving food transfers was not independently associated with higher life satisfaction among these girls in this sample.

Food-related social protection programmes in Bangladesh, such as VGD and VGF, mainly focus on reducing hunger and improving nutrition. Improving emotional well-being or life satisfaction is not the main aim of these programmes. In addition, these programmes mostly target poor rural households and women. These groups are already vulnerable and often face numerous other challenges that can impact their life satisfaction. As a result, providing food support alone may not be sufficient to improve overall life satisfaction(Chakarvarti, 2022).

Even when households receive food transfers, they may still face financial difficulties, family stress, relationship problems, and social challenges. Adolescent girls living in these households may also experience emotional stress, hormonal and physical changes, limited freedom and opportunities, and difficulties in social relationships. Since these deeper problems remain, the association between food transfer support and their life satisfaction may be limited.

This study also focuses only on adolescent girls aged 15–17 years. In many cases, these girls may not be fully aware of the food support received by the household, as this support is often managed by parents or mothers. In addition, the amount of food received may be small and shared among all family members.

In many Asian cultural settings, when food is scarce, nutritious foods such as meat and eggs are often prioritised for the household head, typically the father, and male children. Mothers and female children may receive smaller or less nutritious portions. As a result, adolescent girls may still face food shortages and poor nutrition, even when their households receive food transfers. As a result, they may not feel improved happiness or life satisfaction.

When food support is insufficient, irregular, or uncertain, it may help alleviate hunger but may not be sufficient to improve overall life satisfaction. This may help explain why no significant association was observed between food-related social transfers and the life satisfaction of adolescent girls in this study after adjusting for socio-demographic factors.(Jamaluddine & Sieverding, 2022) Some studies suggest that positive associations between social transfers and life satisfaction tend to be indirect, operating through increased household stability, reduced stress, and improved future opportunities (Gulema et al., 2024).

5.3.1.2 Lower life satisfaction among food-transfer recipient households

Although the receipt of household food-related transfers was not a significant predictor in the regression models, the descriptive results showed that adolescent girls from households receiving food transfers had a lower mean life satisfaction than girls from households without food-transfer receipt.

The characteristic analysis revealed that adolescent girls from food-transfer-receiving households were already more likely to come from poor households, rural areas, and households with low parental education levels (primary or below). These girls were also more likely to have never attended school. These types of characteristics can associated with the overall life satisfaction of adolescent girls, even when they are receiving food transfers.

Also, food support is mostly targeted at families who are already vulnerable. Many of these households may be struggling with unemployment, chronic poverty, and food insecurity. Some households may also be female-headed or single-parent households. These ongoing problems can be significantly associated with adolescent life satisfaction more than any temporary happiness they may derive from receiving food support.

In some communities, receiving social transfer support may create a negative feeling. When the support is for a basic need, such as food, this feeling can be stronger. During this young age, with more emotional changes, girls can easily feel shame, stigma, or social comparison, especially with friends. This may reduce their confidence and self-esteem, ultimately leading to lower life satisfaction.

5.3.1.3 Timing of Food-Transfer Receipt and Life Satisfaction

This study also examined the association between the timing of receiving food-transfer support and the life satisfaction of adolescent girls aged 15–17 years in Bangladesh, whether the food transfer was received months ago or years ago. However, no significant relationship was found between the timing of food-transfer receipt and the life satisfaction of adolescent girls.

This may be because when a household receives food support, they may feel some immediate relief or satisfaction at that time. However, after that period, the household may still continue

to struggle with many problems and ongoing stress. Additionally, examining only the timing of food-transfer receipt may not be sufficient to fully understand the actual situation of the families. Other important factors, such as the quantity of food received, the frequency of support, and the type of food transfer, were not captured in this analysis.

Even if the food transfer was received months or years ago, adolescent girls may still be struggling with many other problems. These include low education levels, limited opportunities, physical and mental changes during adolescence, family problems, and difficulties with social relationships at school or with friends. Due to these challenges, the timing of food receipt alone may not be associated with their overall life satisfaction.

Overall, this study helps to understand that while food transfers may help households to manage or balance their basic food needs, adolescent girls still face many other challenges related to socio-demographic factors. These include household education levels, household wealth, area of residence (rural or urban), and school attendance. Food transfers alone may not appear sufficient, on the basis of this study's findings, to offset these broader challenges, even when support was received in the past.

5.3.2 Sociodemographic Determinants of Life Satisfaction

The Social Determinants of Health (SDH) framework helps to explain that the health and well-being of a population cannot be shaped only by medical care. It is often linked to social and economic conditions, including education, socioeconomic background, living conditions, and family environment. The findings of this study are broadly consistent with the SDH framework (Jones, 2017; Yaya et al., 2019).

This study found that, instead of food-transfer support, socio-demographic characteristics such as parental education, household wealth, school attendance, sex of household head, and area of residence were more strongly associated with the life satisfaction of adolescent girls aged 15–17 years in Bangladesh. These factors showed a stronger association with girls' life satisfaction than receipt of food-related social transfers.

5.3.2.1 Parental or Household Head's Education

The results of this study found that having a household head or mother with primary or lower education was strongly associated with lower life satisfaction among adolescent girls. Parents with higher levels of education tend to have better job opportunities, higher incomes, and more stable economic conditions, which is generally associated with children having greater access to better food, educational materials, clothing, and other essential needs.

Educated parents typically possess a greater understanding of nutrition, education, and emotional support. They are more likely to understand the emotional and physical needs of adolescent girls and can support them during stressful situations. They can guide their children when they face academic pressure, emotional difficulties, or social problems. Educated parents are also better able to notice changes in their children's behaviour and well-being. (Glass et al., 2020; Sherr et al., 2021)

From an academic perspective, educated parents can better understand the demands of school, their child's academic progress, and potential learning difficulties. They are more likely to communicate with teachers and schools and support their children's education. This support may helps adolescent girls feel more confident, reduces stress, and makes them feel safer at home.

Parents with higher education also help their children understand the importance of education, future goals, and life opportunities. This may fosters motivation, hope, and a positive outlook on the future. These factors may be associated with increased life satisfaction among adolescent girls.

In contrast, when parents have low education levels, these supportive conditions may be less present at home, which may be associated with greater stress, fewer opportunities, and lower life satisfaction among adolescent girls. Overall, these findings suggest that parental education is associated with the life satisfaction of adolescent girls. Parents' knowledge, skills, experience, and guidance appear to contribute to a stable and supportive home environment, and their role extends beyond meeting basic needs.

5.3.2.2 Household Wealth

Household wealth was also strongly associated with life satisfaction of adolescent girls. According to this study, adolescents from poorer households reported lower life satisfaction, while adolescents from richer households reported higher life satisfaction.

Households with poor economic status often struggle with food insecurity and meeting other basic needs. They may face difficulties in paying for school-related needs such as books, uniforms, and learning materials. These families may also struggle with health-related expenses such as medical bills and treatments. In addition, they may face housing problems, such as living in rented or shared houses, and difficulties with basic utilities like water and electricity. All these situations can create stress in adolescents' daily lives(Jamaluddine & Sieverding, 2022).

When families are wealthier, they are less likely to face these problems. They usually have better financial security to meet basic needs. They can support their children's education more easily, including paying for school expenses, private tuition, or extracurricular activities when needed. Wealthier families can also afford better healthcare, housing, and stable utility services. This may create a more stable and comfortable home environment, which helps adolescents feel safer and more satisfied with their lives.

On the other hand, adolescents from poorer families may experience embarrassment, social exclusion, or discrimination in their community or at school. These experiences may reduce their confidence and self-esteem, especially among adolescent girls. Feeling different from peers because of poverty can negatively affect their life satisfaction.

Overall, household wealth shows a strong association with the life satisfaction of adolescent girls. Better economic conditions may be linked with reduced stress, improved living conditions, and more positive emotional and social development during adolescence.

5.3.2.3 School Attendance

School attendance was also strongly associated with the life satisfaction of adolescent girls. This study found that adolescents who had never attended school reported lower life satisfaction compared to those who had attended school.

School is the main social place for young adolescents. It may help them create friendships, establish social identity, and build social networks. When girls do not attend school, they may feel isolated and limited to the household environment. This may reduce their social exposure and emotional support.

When adolescent girls attend school, they experience academic achievements and personal improvements. These achievements may help them feel proud of themselves and motivate them to think positively about their future. School attendance may also give them hope, goals, and a sense of direction in life, which is associated with better life satisfaction. (Koly et al., 2023; Yaya et al., 2019)

School may also help reduce stress among adolescent girls. Teachers, classmates, and school activities may sometimes help them cope with family problems or emotional difficulties. The school environment may provide encouragement, routine, and emotional support, all of which are essential during adolescence.

Overall, this study may suggest that education is not only important for academic achievement. It is also strongly associated with the mental and social development of adolescent girls. School attendance shows a strong association with their confidence, motivation, and overall life satisfaction.

5.3.2.4 Sex of Household Head

The results of this study showed that the sex of the household head, whether male or female, was associated with the well-being of adolescent girls. Girls living in male-headed households reported higher life satisfaction than girls living in female-headed households.

Female household heads may often face additional challenges, including low salaries, limited job opportunities, and excessive workloads. Due to this, female-headed households may face greater financial challenges compared to male-headed households. These economic difficulties may create stress within the household, which in turn affects the life satisfaction of adolescent girls.

When the household head is female, families may also face lower levels of safety and security, especially when they have adolescent girls. In some situations, these girls may face more risks, such as abuse or unwanted attention from outside. In contrast, when the household head is male, girls may feel more protected, safe, and confident.

These situations may more common in cultural settings such as South Asian countries and lower-middle-income countries like Bangladesh. Female-headed households may also experience social exclusion, stigma, or cultural barriers within the community. These pressures can further affect the emotional well-being of adolescent girls(Uthso & Akter, 2022).

Overall, this study suggests that gender inequality and social and cultural barriers, rather than the abilities of mothers, play an important role in shaping the life satisfaction of adolescent girls. Living in a female-headed household may bring additional social and economic pressures, which may negatively affect girls' life satisfaction.

Area of residence also showed a significant association with the life satisfaction of adolescent girls. In this study, adolescent girls living in rural areas reported slightly higher life satisfaction compared to girls living in urban areas.

Many rural adolescent girls tend to live in extended family settings and close-knit neighbourhoods. This often provides stronger emotional, social, and family support for girls. In contrast, urban families are more likely to live in smaller family units, with limited interaction with neighbours and weaker community connections. As a result, urban girls may experience less social and emotional support in their daily lives.

Adolescent girls in rural areas are also more likely to be exposed to cultural traditions and community activities. Living in a natural village environment, with open spaces and familiar

surroundings, may help girls feel happier, more relaxed, and more motivated. These factors can contribute to a better sense of self-esteem and increased freedom.

Urban life, on the other hand, is often more challenging and competitive. Urban adolescent girls may face higher academic pressure, stronger social comparisons, and greater societal expectations. These pressures may increase stress and reduce overall life satisfaction.

Overall, although rural households may have fewer facilities and lower economic resources, adolescent girls living in rural areas may still report higher life satisfaction, which may be associated with stronger social support, family connections, and a more supportive living environment.

5.3.2.5 Non-significant Socio-demographic Factors

During this study, some socio-demographic characteristics did not show a significant association with the life satisfaction of adolescent girls aged 15–17 years in Bangladesh. One of these factors was the marital status of the adolescent girls. Marital status was not significantly associated with their Life satisfaction. This may be because most of the adolescent girls in the sample were unmarried. Additionally, since all participants were aged between 15–17 years, this is a relatively narrow age range, and significant differences in life satisfaction related to marital status are less likely to be observed at this stage.

The relationship of the adolescent girl to the household head was also not significantly associated with their life satisfaction. This finding suggests that, in many households in Bangladesh, children may receive similar care and support regardless of whether they are biologically related to the household head or not. This indicates that emotional care and daily support may not depend strongly on biological relationships within the household.

Overall, these non-significant socio-demographic factors indicate that certain characteristics were not significantly associated with the life satisfaction of adolescent girls in this study. Instead, broader and stronger determinants, such as education, household wealth, area of residence, and school attendance, play a more significant role in shaping their life satisfaction.

5.4 Interaction Effects

Besides the key regression models, this study has considered interaction effects to determine whether the relationship between household receipt of food-related social transfers and life satisfaction among 15–17-year-old girls in important socio-demographic subgroups differs. Interaction effects are important to test, since although a grouping may be weak or non-significant, the action of an exposure, such as social protection, is subject to change depending on social and household circumstances. This method is especially appropriate in the context of the Social Determinants of Health (SDH) framework, as the framework emphasises that the structural determinants of well-being, including education, wealth, household composition, and living environment, can affect the way interventions affect well-being.

To test the effect modification, separate interaction terms were added to the adjusted complex-samples regression models. The interaction tests were conducted between the household food-transfer receipt and each of the following variables: household educational status (the education of the mother or the household head), household wealth index, urban or rural residence, school attendance, sex of the household head, relationship with the household head, and marital status. The modelling strategies were analysed in each interaction term applied in the study (i) linear regression models that view life satisfaction as a continuous outcome and (ii) logistic regression models that view life satisfaction as a binary outcome (low versus high life satisfaction). To make an inference that was nationally representative, the Complex Samples module of SPSS

was used to estimate all models, allowing for the consideration of sampling weights, clustering, and stratification.

The results showed that most interaction terms were not statistically significant, however, two significant interactions were identified in the logistic regression model (food transfer × mother's education, $p = .003$, food transfer × marital status, $p = .040$), The remaining five interaction terms were not statistically significant ($p > .05$). in the linear regression or logistic regression model when the full set of socio-demographic covariates was added to the model. This indicates that there were no significant differences in socio-economic and demographic subgroups in the relationship between food-transfer receipt and adolescent life satisfaction across the subgroups in the study sample. Practically, the non-significant interaction effects indicate that the lack of an overall relationship between food-related social transfers and life satisfaction was consistent across types of household education and wealth, place of residence, schooling status, and household head characteristics. This suggests that receiving food transfers did not significantly enhance or deteriorate life satisfaction in a given subgroup of girls more than in other girls, when analysed in terms of socio-demographic background.

These findings are consistent with the main analyses. Had significant interactions been found, this would have suggested that the association between food assistance and life satisfaction varies across certain social circumstances. The overall pattern of interaction effects instead suggests that the association between household food transfer receipt and life satisfaction did not differ meaningfully across the socio-demographic subgroups examined. This is in line with the broader pattern in the data, whereby structural factors particularly education, family income, and school attendance show a stronger association with adolescent life satisfaction than food-based social transfers considered in isolation.

In general, the interaction analysis is consistent with the SDH-based interpretation of the results: although food transfers may help address short-term material needs, their association with the life satisfaction of adolescents appears weak and although significant differences were observed by mother's education and marital status. This pattern suggests that food support alone may not be sufficient to enhance adolescent life satisfaction, and that broader socio-economic disadvantages consistently associated with life satisfaction across the population may also warrant attention.

5.5 Comparison with Previous Literature

This study found that adolescent girls aged 15-17 years in Bangladesh reported a moderate level of life satisfaction. This finding is consistent with previous studies conducted in Bangladesh and other countries that have examined the well-being of adolescent girls. Several studies have shown that adolescents often experience moderate or slightly higher life satisfaction, and their life satisfaction is strongly associated with different socio-demographic factors.

This study also found that socio-demographic characteristics, such as parental education, household wealth, sex of the household head, area of residence, and school attendance, were strongly associated with the life satisfaction of adolescent girls. Hasan et al. (2024) found that people in Bangladesh generally report a moderate level of subjective well-being. Their study also revealed that well-being in Bangladesh is significantly influenced by gender, area of residence, educational level, and social status. In addition, they highlighted that economic conditions, cultural values, and religious background play an important role in shaping people's well-being (Hasan et al., 2024).

Similarly, Uthso & Akter (2022) found that women of reproductive age in Bangladesh reported a moderate level of subjective well-being. Their study revealed that well-being was strongly correlated with education, socioeconomic status, age, marital status, and other socio-demographic factors. These findings are consistent with the results of the present study and support the notion that subjective well-being in Bangladesh is closely tied to social and economic conditions. (Uthso & Akter, 2022)

Adolescence is a particularly critical stage of life compared to other age groups due to the rapid physical, hormonal, and emotional changes that occur during this period. These changes are often more challenging for girls than for boys. Therefore, the finding of moderate life satisfaction in this study supports the idea that adolescent girls in Bangladesh are managing their daily lives reasonably well; however, they still face many challenges that affect their life satisfaction.

Koly et al. (2023) reported that adolescent girls are more vulnerable to depression-like psychological problems compared to male adolescents. They also found that lower emotional well-being among adolescents is associated with poor academic performance, weak school connections, and parental comparison with others. Their study, which was conducted among Bangladeshi adolescents during the pandemic period, highlights the mental health challenges faced by young people, especially girls (Koly et al., 2023)

In Bangladesh and many other South Asian countries, cultural and religious norms continue to influence daily life. Gender norms, early marriage, early motherhood, and limited freedom are still common in many communities. These factors tend to affect girls more than boys and may be associated with lower life satisfaction among girls. Piko, B. F., & Hamvai, C. (2010) found that adolescent girls have a higher risk of depression and lower psychological well-being than

boys. Their study also showed that religious and social support can help improve life satisfaction among adolescents.

Hasan et al. (2024) also found that subjective well-being in Bangladesh is influenced by cultural and religious factors, which may explain why many people report moderate rather than very high life satisfaction. These findings support the results of the present study and help explain the moderate level of life satisfaction reported by adolescent girls (Hasan et al., 2024)

This study found no significant association between self-reported life satisfaction and household receipt of food-related social transfer support among adolescent girls aged 15 to 17 years in Bangladesh. Many food-related social protection programmes mainly focus on reducing food insecurity and improving nutrition among vulnerable households. They do not directly aim to improve mental health or emotional well-being.

Chakarvarti (2022) demonstrated that social protection programmes in Bangladesh help reduce food insecurity and improve household economic conditions; however, they did not examine the impact of these programmes on subjective well-being. The findings of the present study suggest that households receiving food transfers are already among the most vulnerable groups in the community. These households often face poverty, low parental education, poor living conditions, and unemployment(Chakarvarti, 2022).

In such situations, adolescent girls may continue to experience low life satisfaction even when food support is provided. Jones (2017) found that food insecurity is strongly associated with poor mental health and lower psychological well-being across different populations worldwide. This supports the finding that food support alone may not be sufficient, on its own, to improve the life satisfaction of adolescent girls when other social and economic challenges remain. (Jones, 2017)

Overall, the findings of this study align with the Social Determinants of Health (SDH) framework and previous literature. Taken together with existing research, this study suggests that the life satisfaction of adolescent girls is associated with multiple factors, including social, economic, and educational conditions.

It has also been reported that the well-being of women and adolescents depends on multiple factors, including social, economic, educational, cultural, and religious factors. These studies clearly demonstrate that well-being is not dependent on a single factor(Akter, 2022; Gulema et al., 2024; Koly et al., 2023).

Therefore, addressing the life satisfaction of adolescent girls likely requires a multi-factorial approach. Addressing only one area, such as food support, may not be enough; a combined approach that considers education, household conditions, social environment, and economic stability appears necessary to support the life satisfaction of adolescent girls in the community.

5.6 Strengths of the Study

This study used nationally representative data from the UNICEF MICS 2019 survey in Bangladesh. This survey employs scientifically approved and valid methods for data collection, and it is conducted evenly across all divisions of the country. As a result, the data represent adolescent girls from all regions of Bangladesh. This makes the findings more general and useful compared to studies that focus only on a small or local area.

A total of 6,678 adolescent girls aged 15–17 years were included in this study. This is a large sample size compared to many other studies conducted on adolescent girls and their life satisfaction. The large sample size enabled the production of more accurate and reliable results. It also allowed meaningful comparisons between different subgroups of adolescents.

The data analysis was conducted using the complex samples module in SPSS version 30. This method was suitable for analysing the two-stage stratified cluster sampling design used in the MICS survey. The analysis adjusted for sample weights, strata, and clusters. This helped to improve the accuracy and validity of the results.

Another strength of this study is the use of two different ways of measuring life satisfaction. Life satisfaction was analysed as a continuous variable using the Cantril ladder scale from 0 to 10, and as a binary variable, categorised as low life satisfaction (0–5) and high life satisfaction (6–10). Using both approaches helped to capture adolescent life satisfaction in more detail. The continuous measure provided a full range of life satisfaction levels, while the binary measure allowed easier interpretation for policymakers and programme planners.

This study was guided by the Social Determinants of Health (SDH) framework, a robust and widely used framework in public health research. Using this framework helped to link adolescent girls' life satisfaction with their socio-demographic characteristics and household conditions. This strengthened the interpretation of the findings and increased the overall validity of the study.

In addition, separate analyses were conducted for households that received food transfers, along with characteristic analyses, subgroup analyses, and interaction effects analyses. These analyses were conducted in addition to the main regression models. This helped to confirm the consistency of the findings and provided a deeper understanding of how different factors influence the life satisfaction of adolescent girls aged 15–17 years in Bangladesh.

Overall, very few studies in Bangladesh have examined the subjective life satisfaction of adolescent girls, particularly among those aged 15–17 years. There is also very limited evidence on the association between household receipt of food-related social transfers and the

life satisfaction of adolescent girls. By addressing these gaps, this study contributes important knowledge to both academic research and policy discussions. It helps to improve understanding of social protection programmes and adolescent life satisfaction in Bangladesh.

5.7 Limitations of the Study

Although this study provided deeper insights into the association between self-reported life satisfaction of adolescent girls and the receipt of household food-related social transfers among girls aged 15–17 years in Bangladesh, several limitations should be noted.

This study used secondary data from the UNICEF MICS 2019 survey in Bangladesh. This survey was designed as a cross-sectional study, meaning data were collected at a single point in time. Due to this, it is not possible to establish causal relationships between food-related social transfers and life satisfaction. The study can only identify associations, not direct cause-and-effect relationships.

Additionally, the available data on food-related social transfers was limited. More detailed information would have been useful, such as the type of food transfer received (for example, school feeding programmes, VGD, VGF, or other social protection programmes), the duration of support, frequency of receiving food, quantity of food provided, and whether adolescent girls personally benefited from the support or how food was shared within the household. If these details were available, it would have helped to better understand how food-related social transfers influence the life satisfaction of adolescent girls.

Life satisfaction in this survey was measured using a single self-reported question. While this measure is widely used and useful, it may reflect only the adolescent's current emotional state at the time of the interview. More detailed questions or the use of multiple tools could provide

a deeper and more reliable understanding of adolescents' mental, emotional, and social well-being.

Although the overall sample size of this study was large, some subgroup analyses had relatively small sample sizes. For example, only about 13% of the total sample included households that received food transfers. When analysing interaction effects within these subgroups, some results may not have reached statistical significance due to the small sample size rather than a true lack of association.

Ultimately, the life satisfaction of adolescent girls in Bangladesh may vary depending on cultural practices, religious beliefs, gender norms, and regional differences throughout the country. These sensitive social and cultural factors were not fully captured in the dataset. Including such information could have provided a deeper understanding of the life satisfaction of adolescent girls.

Despite these limitations, this study still provides important evidence on adolescent girls' life satisfaction and its association with household food-related social transfers in Bangladesh.

5.8 Policy and Programmatic Implications

The findings of this study indicate that household receipt of food-related social transfers, on its own, was not significantly associated with the life satisfaction of adolescent girls aged 15–17 years in Bangladesh. This study also found that other socio-demographic factors, such as school attendance, household wealth, education of the household head, sex of the household head, and area of residence, showed a stronger association with the life satisfaction of adolescent girls than receipt of food transfer support.

These findings may have relevance for how food-related social transfer programmes are considered alongside other supportive interventions, although this study did not evaluate any specific programme. Most government and non-government food-related social protection programmes in Bangladesh primarily aim to reduce food insecurity in vulnerable households; they are not typically designed to address emotional or psychological well-being directly. This may help to explain why, in this study, adolescent girls from food-transfer-receiving households did not report higher levels of life satisfaction: other social and household factors appear to remain associated with their life satisfaction regardless of food support.

The results also indicate that adolescent life satisfaction is associated with the household and social environment. This may point to potential value, for policymakers to consider, in complementing social protection programmes with additional supports at the individual, household, and community levels, for example, mental health awareness activities, counselling services, supportive group activities for adolescents, and parental education programmes on adolescent development and emotional support. Such community-level supports could potentially be considered alongside existing food support programmes, although this would require dedicated evaluation beyond the scope of the present study.

This study also found that adolescent girls from food-transfer-receiving households were predominantly from poorer households, households with lower parental education, rural areas, and female-headed households, and that these girls reported lower levels of life satisfaction, suggesting that they may be more vulnerable than others. Policymakers and relevant authorities may wish to give particular attention to these groups when designing social protection programmes.

School attendance was one of the strongest factors associated with the well-being of adolescent girls. Girls who had never attended school reported much lower life satisfaction than those who attended school. School attendance helps adolescents transition beyond their household environment, build social relationships, acquire education, and develop confidence. Therefore, policymakers may wish to focus on improving school attendance among adolescent girls, especially those from vulnerable households. This could include programmes that raise awareness about the importance of education, identify girls who are out of school, and provide targeted support to help them continue their education.

Combining education support with food-related social protection programmes may help improve the overall life satisfaction of adolescent girls. These findings align closely with the Social Determinants of Health framework, which suggests that adolescent well-being is associated with factors such as education, income, household environment, and social conditions.

Overall, the results of this study can help policymakers, as well as government and non-government organisations, design better and more integrated social protection programmes. By combining food support with education and well-being interventions, these programmes can better support the emotional, social, and mental well-being of vulnerable adolescent girls in Bangladesh.

5.9 Contribution to Knowledge

The present study makes several important and novel contributions to the existing body of literature on adolescent life satisfaction, social protection, and public health in the context of low- and middle-income countries, particularly in Bangladesh. The research offers a major gap

in the national and international literature by examining the relationship between self-reported life satisfaction and household receipt of food-related social transfers among adolescent girls aged 15-17 years. In Bangladesh, previous studies have mostly investigated the results of adolescents individually, focusing on one aspect at a time, such as nutrition, education, reproductive health, or early marriage. In contrast, this research will combine these areas in a more explicit manner, as social protection related to food will be considered alongside life satisfaction, providing a more comprehensive view of adolescent development.

The main contribution of the study is its empirical result, which indicates that no significant association exists between household receipt of food-related social transfers and the self-reported life satisfaction of adolescent girls. This result challenges the assumption that improvements in material conditions (such as access to food) necessarily correspond to improvements in psychological or emotional well-being. Although food-related social transfers are important for alleviating hunger and improving nutritional outcomes, the findings of this study suggest that they were not, on their own, associated with higher self-reported life satisfaction among adolescents in this sample. This observation contributes to the broader international discussion about the limitations of single-sector social protection approaches and points to the value of considering broader determinants of life satisfaction.

The research also adds to the body of knowledge by shedding more light on the significance of socio-demographic and structural variables associated with adolescent life satisfaction. The results all point in a similar direction, indicating that household wealth, parental and household head education, school attendance, the sex of the household head, and area of residence are more significantly related to life satisfaction than food transfer receipt. These findings support the view that adolescent life satisfaction is situated within a complex social and economic context. The study provides evidence of the relative strength of these associations, supporting

the case for more multidimensional and integrated policy responses, rather than narrowly focused interventions.

Another impact of this study is its high theoretical alignment with the Social Determinants of Health (SDH) framework. Although the SDH framework is widely applied in public health studies, its application to the issue of adolescent life satisfaction within the context of food-related social transfers is limited, particularly in the South Asian environment. This paper operationalises the SDH framework by incorporating household, educational, economic, and demographic variables into the research, thereby demonstrating how various determinants interact to affect the life satisfaction of adolescents. By doing so, the study will contribute to theoretical knowledge by demonstrating that food security is merely a single element of an extended system of social determinants, rather than, on the basis of this study's findings, a primary driver of life satisfaction on its own.

This study methodologically adds to the literature since it utilises nationally representative data on the UNICEF Multiple Indicator Cluster Survey (MICS) data 2019. In Bangladesh, few studies have examined subjective well-being among adolescents using large-scale and nationally representative data. This study provides a comprehensive and generalizable understanding of adolescent life satisfaction, focusing specifically on girls aged 15–17 years in all administrative divisions of Bangladesh. Complex-sample statistical methods, such as weighted regression models and sensitivity analyses, further enhance the methodological rigour of the research, as well as the trustworthiness of the results.

Besides this, the study also contributes to knowledge by the way it handles missing data and its strength test. The study is transparent and methodologically rigorous by providing an MCAR test of maternal education, sensitivity analysis, and interaction effects. These analytical

procedures are not necessarily applied in the analysis of secondary data, but are crucial in guaranteeing the validity and reliability of the outcomes. By doing so, the study establishes a methodological standard for future quantitative studies about adolescent life satisfaction, based on large-scale survey data.

In terms of gender, this study makes a significant contribution, as it focuses on adolescent girls as the primary point of analysis, rather than extending to adolescents or children. Gender norms, barriers to education, exposure to early marriage and unequal distribution of resources within the household are some social, cultural and economic challenges that confront adolescent girls in Bangladesh. The study targets the girls solely and thus does not obscure the gender-specific vulnerability and provides gender disaggregated evidence, which is extremely relevant in terms of policy and programme design.

The findings of this study may also be relevant to policy discussions. Although the study did not evaluate a specific programme and therefore cannot inform programme redesign directly, the finding that food-related social transfers were not significantly associated with life satisfaction may be of interest to policymakers and development practitioners considering how food assistance could be combined with other supplementary elements. It could be considered alongside educational support, economic empowerment, psychosocial services, and gender-sensitive programming within the wider social protection system.

Lastly, this research paper contributes to the academic community of research on measuring subjective well-being in low-resource contexts. It is through the Cantril Ladder, a validated and internationally recognised scale of life satisfaction, that the research contributes to the possibility of using subjective well-being indicators in mass household surveys.

Simultaneously, the research also highlights the limitations of one-item scales and advocates for further methodological innovation to measure adolescent well-being more effectively.

Overall, this research is relevant on multiple levels, including empirical, theoretical, methodological, and policy-oriented perspectives. It contributes to existing knowledge of the factors associated with the life satisfaction of adolescent girls in Bangladesh, challenges simplified assumptions about the association between food-related social transfers and life satisfaction, and highlights the importance of considering other forms of social and economic inequality. The results provide a powerful basis for further studies and offer evidence-based messages that can be used to create more efficient, comprehensive, and gender-sensitive interventions to enhance the well-being of adolescent girls, who form a crucial foundation for Bangladesh's future social and economic progress.

6 Conclusion and Recommendations

6.1 Overall Conclusion of the Study

This chapter presents the overall conclusions of the study, drawing together its main findings and their implications, and offers recommendations for policy and future research.

The study examined the relationship between self-reported life satisfaction and the receipt of household food-related social transfers among adolescent girls aged 15–17 years in Bangladesh, guided by the Social Determinants of Health (SDH) framework.

Overall, this study provides valuable insights into the life satisfaction of adolescent girls aged 15–17 years in Bangladesh, as well as their association with household food-related social transfers and other socio-demographic characteristics.

6.2 Key Conclusions of the Study

Overall, the results indicate a moderate level of life satisfaction among adolescent girls in Bangladesh (mean score of 6.1 out of 10), with no statistically significant association found between household receipt of food-related social transfers and life satisfaction once socio-demographic factors were adjusted for, despite a significant association being present before adjustment. This pattern held regardless of whether life satisfaction was measured as a continuous or binary variable, and regardless of the timing of food transfer receipt. While food-related social transfers remain important for addressing food insecurity and meeting basic nutritional needs, the findings suggest that they are not, on their own, associated with a measurable improvement in adolescents' life satisfaction.

In contrast, several socio-demographic factors showed a consistent and significant association with life satisfaction: household and maternal education, household wealth, school attendance, sex of the household head, and area of residence. Girls from less educated, poorer, and female-headed households, and those who had never attended school, reported lower life satisfaction. These findings are consistent with the Social Determinants of Health framework and suggest that adolescent life satisfaction in Bangladesh is shaped more by broader structural and socio-economic conditions than by food-related social transfers alone, underscoring the need for multidimensional policy approaches that address education, poverty, and social support alongside food assistance.

6.3 Policy Recommendations

The findings of this study helped propose several policy recommendations relevant to the life satisfaction of adolescent girls aged 15-17 years in Bangladesh. These recommendations focus on integrating a well-being approach into existing social protection programmes, especially food support programmes implemented in the country.

6.3.1 Strengthening Food-Related Social Protection Programmes

This research evidence suggests that household receipt of food-related social transfers alone is not associated with a substantial improvement in the life satisfaction of adolescent girls aged 15–17 years in Bangladesh. Although these programmes are crucial in alleviating hunger and increasing household food security, they are primarily intended to address the physical needs of the household, such as nutrition and calories. Consequently, they tend to overlook the emotional, psychological, and social aspects of well-being, which are of great significance

during adolescence. This may help explain why the study did not find a significant positive association between receipt of food transfer and life satisfaction among adolescent girls.

Adolescence is a delicate phase of development; it is a period of rapid development both physically, emotionally, and psychologically. At this age, girls need not only proper nutrition but also emotional support, as well as a sense of security and an opportunity to develop themselves. Food-related social protection programmes that are limited to household-level food provision may not be effective in addressing stress, anxiety, and psychosocial distress among adolescent girls living in vulnerable households. Consequently, to improve such programmes, there is a need to adopt a change in perspective, where purely nutrition-based programmes are transformed into holistic well-being-based models.

Another policy suggestion is to incorporate the elements of basic mental health and psychosocial support into current food-focused social protection programmes. These may include community-based counselling services, group counselling sessions for adolescent girls, mental health awareness sessions, and age-specific life skills programmes with food assistance. These low-end community-based interventions may assist adolescent girls to gain emotional resilience, self-esteem, and become more effective in the face of household stress associated with poverty and food insecurity. Such interventions can be improved by food support to increase physical security and emotional well-being, and increase life satisfaction more meaningfully.

Furthermore, social protection programmes addressing food-related issues may also be reinforced by connecting them with schools and community centres. Schools, community centres, and local health facilities can be effective channels through which complementary services for adolescent girls can be offered. For example, school-based programmes to

encourage further education, socialisation, and emotional support can be synchronised with food assistance. This approach is especially relevant, given that school attendance in this study was positively associated with higher life satisfaction. Combining food support with educational involvement can create a more consistent and accommodating atmosphere, thereby supporting both education and well-being.

On a broader policy scale, reinforcing social protection programmes related to food in this manner is highly compatible with the Social Determinants of Health framework. The SDH framework emphasises that health and well-being are influenced by various interacting factors, including material conditions, education, social support, and the broader environment. Solving the issue of food insecurity in isolation, without considering these other determinants, will likely not bring about significant changes in the well-being of adolescents. Consequently, social protection programmes related to food need to be modelled on a multi-sectoral approach that advocates nutrition, education, and psychosocial health issues.

6.3.2 Targeting Vulnerable Groups

This research indicates that lower life satisfaction among adolescent girls aged 15–17 years in Bangladesh is concentrated among certain vulnerable groups. They comprise girls in families where the parent or household head's education was low, poor socio-economic status, and female-headed families. This trend suggests that vulnerability is not evenly distributed among the adolescent population and that a universal method of social protection may not be sufficient to address the compounded disadvantages faced by certain groups of girls. Thus, social protection policies must be more targeted at addressing the characteristics of individuals who are more vulnerable to poor life satisfaction.

Given that household socio-economic status and parental education were significant predictors of life satisfaction in this study, improved social protection support targeting these households could help to minimise inequalities and provide adolescent girls with a more stable and supportive environment.

The research also discovered that adolescent girls who live in a household headed by a woman had lower levels of life satisfaction as compared to those who live in a male-headed household. The female-headed households in Bangladesh tend to be more economically disadvantaged as they have limited income opportunities, stigma, and weaker connection to social networks. Girls in the homes of such households can undergo increased emotional stress because they are exposed to the economic hardships of their caregivers or become more responsible around the house. The social protection programmes ought therefore to focus on female-headed families by covering them properly, providing assistance in times of need, and offering other services such as alleviating financial burdens and emotional pressures within the family.

Place of residence showed a statistically significant association with life satisfaction in this study, with girls in rural areas reporting slightly higher life satisfaction than girls in urban areas. While rural areas may face disadvantages in access to services, this finding suggests that contextual factors such as community cohesion, social support, and family connectedness may shape life satisfaction in complex ways. Future programmes should therefore be sensitive to both rural and urban contexts and investigate the mechanisms underlying these differences.

School attendance was found to be associated with higher life satisfaction. Adolescent girls who had never attended school reported significantly lower life satisfaction than girls who had ever attended school. Academic knowledge is not the only benefit that education offers; it also provides social interaction, structure, a sense of purpose, and future aspirations that are closely

tied to well-being during the adolescent stage. More weight should then be given to social protection programmes in favour of encouraging school participation among vulnerable girls. This can be in the form of conditional food or cash transfers linked to school attendance, or direct outreach to girls who have dropped out, are truant, or are not attending school.

These results provide a solid argument in favour of the use of the framework of Social Determinants of Health, which highlights the idea that health is influenced by various social and economic determinants that interact and are interrelated. The satisfaction of adolescent girls with their lives depends on multiple factors, including household wealth, education, gender roles, and living conditions, rather than being dependent on a single factor. In this way, policies to enhance the well-being of adolescents must take a multifaceted approach that addresses the issues of economic vulnerability, access to education, and social support.

Well-designed and context-specific interventions on social protection should be used to target vulnerable groups to address inequalities in adolescent well-being. This can be achieved by placing the most disadvantaged girls first and focusing on the wider societal determinants that influence their lives, hence establishing more successful and equal programmes. These targeted approaches not only enhance the immediate welfare of adolescent girls but also help increase human capital in the long run, leading to a healthier and stronger generation in Bangladesh.

6.4 Recommendations for Future Research

The study provides informative insights into the association between household food-related social transfers and the life satisfaction of 15-17-year-old adolescent girls in Bangladesh. Although the findings will contribute to a research field that has not yet been fully studied, there are still numerous opportunities for future research to advance and enhance the evidence

base. The future study is expected to address the methodological, conceptual, and contextual limitations of the present research and expand its scope to gain a deeper insight into the well-being of adolescents in low- and middle-income countries.

One recommendation for future research is to adopt longitudinal study designs. The current analysis is based on a cross-sectional survey from the 2019 Bangladesh Multiple Indicator Cluster Survey (MICS), which does not allow for conclusions about the causal relationship between food-related social transfers and the well-being of adolescents. Although cross-sectional data are useful in establishing the association, they cannot be used to understand how well-being changes with time or whether food-based social transfers contribute to an enhancement or a decrease in life satisfaction. Longitudinal studies designed to track the lives of adolescents, and their households would enable scientists to test how shifts in household food security, participation in programmes, and changes in socioeconomic status affect subjective well-being at various stages of adolescence. These designs would also assist in detecting the delayed/ cumulative effects of social protection programmes, which are otherwise not visible in single-point-in-time analyses.

Even more multidimensional and comprehensive measures of subjective well-being should also be introduced in future studies. In the given research, life satisfaction has been measured using the Cantril Ladder scale, a single-item scale that assesses the overall evaluation of life. Even though this measure is common and internationally accepted, it does not reflect the complexity of the mental and emotional health of adolescents. Further research may involve the introduction of a validated multi-item scale that measures additional dimensions, such as emotional well-being, stress, anxiety, depressive symptoms, self-esteem, and perceived social support. A composite method of assessment based on both cognitive well-being and affective

well-being scales would give a better insight into the lived experiences of adolescents and can uncover relationships that cannot be identified using single-indication measures.

Another valuable path that future studies should pursue is the inclusion of both girls and boys. Although this study was right in its choice of girls as the most vulnerable group and because they face gender specific difficulties, the inclusion of boys was omitted, and thus, this restricts making comparisons based on gender. Future studies should consider including both genders so that researchers can analyse the similarities and differences in the impact of food insecurity, social transfers, and household properties on well-being. This type of comparison would be useful in determining the extent to which some social protection programmes are skewed towards benefiting a particular gender or not, and in moving towards more gender-sensitive policies and interventions.

Mixed-methods research designs should also be considered in the future. The present research employed an entirely quantitative methodology, which is useful for revealing statistical associations but not suitable for uncovering contextual connotations and experiences. In-depth interviews, focus group discussions, and participatory research methods are qualitative methods that can provide significant insight into the perceptions of food insecurity, social transfers, and household dynamics among adolescent girls, as well as their well-being. The qualitative data may be useful in providing reasons why food-related social transfers do not correspond to life satisfaction, despite their significant role in alleviating hunger. The personal experiences, expectations, and social environment of adolescents can be observed to understand psychosocial processes that are not observable in the data from large-scale surveys.

Additionally, the programme-level data on food-related social transfers should be gathered in more detail in future studies. The study also only analysed whether the households received

food transfers and when they did so, in the current study. Nevertheless, the social protection programmes in food-related issues are diverse in nature, frequency, amount, time span and quality of support. Subsidiary research is necessary to investigate these programme attributes more extensively and determine whether different forms of food support, including regular/irregular support, in-kind food/vouchers, and conditional/non-conditional transfers, have varying impacts on the well-being of adolescents. The incorporation of programme design characteristics would enable policymakers to discern the most successful aspects of food support in enhancing both food security and psychosocial outcomes.

The scope of the contextual and social variables in the analysis should also be increased in future research. Although other determinants of adolescent well-being, including family relationships, parental mental health, peer support, and community safety, as well as exposure to violence and social norms, were not addressed, it is essential to do so, as these factors are major determinants of adolescent well-being. These variables should be included in further studies to provide a more accurate picture of the extended social environment in which the well-being of adolescents is defined. This is more so because the findings of this study indicate that structural and socio-economic variables are more effective in determining well-being than food transfers alone.

Lastly, comparative and cross-country studies may be conducted in future research using similar data. Comparing Bangladesh with other low- and middle-income countries that have dissimilar social protection systems may help in understanding whether the identified lack of correlation between food-related social transfers and adolescent well-being is specific to the country or more universal. This type of comparative research would contribute to the international debate about how social protection programmes are designed and the implications they have for the mental health and well-being of adolescents more broadly.

To conclude, longitudinal and mixed-methods designs, a more holistic well-being measure, both sexes, more detailed programme-level data, and an increased number of social determinants should be introduced in the future. The discussion of these areas will contribute to creating a more policy-relevant understanding of how social protection programmes can be tailored to enhance both food security and the subjective well-being of adolescents in Bangladesh and other similar situations.

6.5 Final Remarks

Adolescence is a critical stage of development, particularly for girls in low- and middle-income countries such as Bangladesh, where gender norms, and cultural and economic conditions, can heighten vulnerability. This study emphasises the importance of understanding adolescent girls' life satisfaction and demonstrates that improving it requires a multifaceted approach that extends beyond food-related social transfers to address education, household wealth, and other socio-demographic conditions.

By drawing on nationally representative data, this study contributes to the evidence base on adolescent well-being and social protection in Bangladesh, offering findings that may be of value to policymakers, practitioners, and researchers working to support adolescent girls as a foundation for the country's future social and economic development.

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Appendix

Appendix Table 1: Quality Appraisal of Included Studies

Study (Author, Year)	**Study Design**	**Appraisal Tool**	**Key Quality Criteria Met**	**Overall Risk of Bias**
Yang et al. (2022)	Cross-sectional	JBI Critical Appraisal Checklist for Cross-Sectional Studies	Clear inclusion criteria; detailed description of subjects and setting; valid and reliable measurement of exposure and outcome; appropriate statistical analysis	Moderate
Diamantis et al. (2023)	Cross-sectional	JBI Critical Appraisal Checklist for Cross-Sectional Studies	Clear inclusion criteria; detailed description of subjects and setting; valid and reliable measurement of	Moderate

			exposure and outcome; appropriate statistical analysis	
Brushett et al. (2024)	Cross-sectional	JBI Critical Appraisal Checklist for Cross-Sectional Studies	Clear inclusion criteria; detailed description of subjects and setting; valid and reliable measurement of exposure and outcome; appropriate statistical analysis	Moderate
McKelvie-Sebileau et al. (2023)	Qualitative	JBI Critical Appraisal Checklist for Qualitative Research	Congruity between the stated philosophical perspective, methodology, data collection,	Moderate (small, single-country sample from a limited number of schools)

			analysis, and interpretation	

Appendix Table 2: JBI Critical Appraisal of Included Cross-Sectional Studies

JBI critical appraisal criterion	**Yang et al. (2022)**	**Brushett et al. (2024)**	**Diamantis et al. (2023)**
1. Were the criteria for inclusion in the sample clearly defined?	Yes	Yes	Yes
2. Were the study subjects and setting described in detail?	Yes	Yes	Yes
3. Was the exposure measured in a valid and reliable way?	Yes	Yes	Yes
4. Were objective, standard criteria used for measurement of the condition?	Yes	Yes	Yes
5. Were confounding factors identified?	Yes	Yes	Yes
6. Were strategies to deal with confounding factors stated?	Yes	Yes	Yes
7. Were the outcomes measured in a valid and reliable way?	Yes	Yes	Yes

8. Was appropriate statistical analysis used?	Yes	Yes	Yes
Overall appraisal	Moderate risk of bias	Moderate risk of bias	Moderate risk of bias

Note: Yes = criterion met; No = criterion not met; Unclear = insufficient information to determine whether the criterion was met.

Appendix Table 3: JBI Critical Appraisal of the Qualitative Study

JBI qualitative critical appraisal criterion	**McKelvie-Sebileau et al. (2023)**
1. Is there congruity between the stated philosophical perspective and the research methodology?	Yes
2. Is there congruity between the research methodology and the research question or objectives?	Yes
3. Is there congruity between the research methodology and the methods used to collect data?	Yes
4. Is there congruity between the research methodology and the representation and analysis of data?	Yes
5. Is there congruity between the research methodology and the interpretation of results?	Yes

6. Is the researcher located culturally or theoretically?	Yes
7. Is the influence of the researcher on the research, and vice versa, addressed?	Yes
8. Are participants and their voices adequately represented?	Yes
9. Is the research ethical according to current criteria, with evidence of ethical approval?	Yes
10. Do the conclusions flow from the analysis or interpretation of the data?	Yes
Overall appraisal	High methodological quality; limitations to generalisability

Note: Yes = criterion met; No = criterion not met; Unclear = insufficient information to determine whether the criterion was met.

Appendix Table 4: Interaction Effects between Household Food Transfer Receipt and Socio-Demographic Factors on Binary Life Satisfaction (Complex Samples Logistic Regression, Cross-Referenced from Section 4.8)

Each row reports a separate Complex Samples binary logistic regression model in which life satisfaction (high = 6–10 vs low = 0–5) was regressed on food transfer receipt, the full set of socio-demographic covariates used elsewhere in this chapter (using mother's education as the education covariate, consistent with the sensitivity-analysis specification), age, and a single food-transfer-by-covariate interaction term. Design degrees of freedom: df1 = 1, df2 = 2469 for all seven models; model Nagelkerke R^2 ranged from .066 to .068 across the seven models.

Two of the seven interaction terms were statistically significant at the 5% level, marked with an asterisk (*): food transfer receipt × mother's/household head's education, and food transfer receipt × marital status (see corrected discussion in Section 4.8). Comparable interaction models for the continuous (linear regression) life-satisfaction outcome are not presented in this appendix.

Interaction term	**B**	**SE**	**Wald F (df1=1, df2=2469)**	**p-value**	**Exp(B)**	**95% CI for Exp(B)**
Food transfer receipt × Mother's/household head's education	0.660	0.222	8.819	0.003*	1.935	1.251–2.992
Food transfer receipt × Wealth index	0.024	0.139	0.029	0.864	1.024	0.779–1.346
Food transfer receipt × Area of residence	0.236	0.263	0.804	0.370	1.266	0.756–2.121
Food transfer receipt × School attendance	0.270	0.861	0.098	0.754	1.309	0.242–7.082
Food transfer receipt × Sex of household head	-0.586	0.322	3.301	0.069	0.557	0.296–1.048

Food transfer receipt × Relationship to household head	0.304	0.302	1.008	0.315	1.355	0.749–2.452
Food transfer receipt × Marital status	0.596	0.290	4.216	0.040*	1.815	1.027–3.207