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Secular trends in body height, body weight, and BMI among rural girls in Eastern Poland, 1986–2021 – ilmplications for public health in an agricultural region

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Abstract

Introduction and objective. Body height, body weight, and body mass index (BMI) are key indicators of physical development and sensitive markers of long-term environmental and socio-economic conditions. This study aimed to assess 35-year secular trends in body height, body weight, and BMI among girls living in rural areas of eastern Poland and to evaluate their public health implications in a predominantly agricultural region.

Material and methods. The study included 11,764 girls aged 7–15 years examined in five cross-sectional surveys conducted in 1986, 1996, 2006, 2016, and 2021 in the same rural schools. Anthropometric measurements were performed in accordance with ISAK recommendations. BMI was calculated and classified using international cut-off points proposed by Cole et al. Secular trends were analyzed using one-way ANOVA with post hoc Games–Howell tests and linear regression, while BMI category distribution was assessed using the chi-square test.

Results. A systematic increase in body height and body weight was observed across all age groups. Between 1986 and 2021, mean body height increased by 7.66 cm and mean body weight by 7.03 kg, with the greatest dynamics occurring during the peripubertal period. Mean BMI increased by 1.37 kg/m^2. A marked shift in BMI category distribution was observed, characterized by an increasing prevalence of overweight and obesity and a decline in the proportion of girls with normal body weight.

Conclusions. The findings confirm persistent secular trends in somatic development among girls from rural areas of eastern Poland and indicate a growing public health challenge related to overweight and obesity, highlighting the need for targeted preventive strategies in rural populations.

Key words

secular trends, body height, body weight, BMI, rural population, adolescent Female, Poland

INTRODUCTION

Body height and body weight are fundamental indicators of physical development, reflecting the combined influence of genetic potential and environmental factors, including nutritional quality, living conditions, and access to health care [1]. Long-term changes in the mean values of these parameters, referred to as secular trends, provide important insights into population health and adaptive capacity under changing socio-economic conditions [2]. In recent decades, European data have indicated a marked slowdown in the increase in body height that was characteristic of the second half of the 20th century, as documented, among others, in Romanian and Swiss populations [2,3]. At the same time, body weight has increased more rapidly than body height, leading to a systematic rise in body mass index (BMI) among children and adolescents. This pattern has been consistently reported in large population-based studies conducted in Europe and in countries undergoing rapid socio-economic transformations [3–5]. The divergent directions of height and weight changes highlight the growing influence of environmental factors promoting excessive weight gain and underscore the increasing complexity of contemporary secular trends.

In Poland, secular trends have been monitored for more than six decades. Early analyses revealed substantial variation between social groups and regions [6,7], and although these disparities have gradually diminished, pronounced spatial differences persist. Urban populations continue to show positive, albeit weakening, trends in body height and a more favourable somatic development profile [8], whereas rural populations and those living in small towns exhibit weaker secular dynamics and more heterogeneous patterns of change [9].

Rural areas of eastern Poland are among the economically least developed regions of the European Union, with gross domestic product (GDP) *per capita* slightly exceeding half of the EU average [10]. These structural constraints are reflected in the physical development of children and adolescents. Previous studies indicate that girls from this region, on average, are shorter and lighter than their peers from more

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affluent areas of the country, and exhibit a smaller magnitude of secular change [11]. More recent analyses have shown a disproportionate increase in body weight not accompanied by a corresponding increase in body height, resulting in rising BMI values and an elevated risk of overweight and obesity among rural youth [12].

Despite the growing number of anthropometric studies conducted in Poland, long-term analyses of secular trends among girls living in rural areas of eastern Poland remain scarce. This represents an important research gap, as these populations experience specific socio-economic conditions that may distinctly shape the pace and direction of somatic development. Therefore, this study aimed to analyze 35-year secular trends in body height, body weight, and BMI among girls residing in rural areas of eastern Poland, and to assess their potential public health implications in a predominantly agricultural region.

MATERIALS AND METHOD

Study area and design. The study was conducted in rural areas of eastern Poland. In 1986, the study area comprised the former provinces of Suwałki, Białystok, Biała Podlaska, Chełm, Zamość, Przemyśl, and Krosno. Following the administrative reform of 1999, these localities were incorporated primarily into the Podlaskie, Lubelskie, and Podkarpackie voivodeships, Provinces, and partly into the Warmińsko-Mazurskie and Mazowieckie voivodeships Provinces. The first series of measurements was carried out in 1986 as part of the nationwide research programme *State Key Problem 10.7*. Schools were randomly selected based on registers maintained by local education authorities, ensuring sample representativeness. Subsequent measurements were conducted in 1996, 2006, 2016, and 2021 in the same educational institutions, allowing for high comparability of data over time. All study waves conducted after 1986 were implemented within statutory research projects of the Józef Piłsudski University of Physical Education in Warsaw (Projects D.S. 49 and D.S. 203). In 2021, the dataset was expanded with measurements obtained as part of the nationwide programme *Active Return to School – Physical Education* conducted in cooperation with the University of Physical Education (agreement No. MEiN/2021/DPI/53 of 7 May 2021). These measurements were conducted in the same schools and using identical anthropometric procedures in accordance with the ISAK protocol. The programme did not modify the measurement methodology and served solely to increase the number of observations. Analyses of demographic characteristics indicated that the socio-economic profile of the schools and participants did not differ from that of populations examined in earlier study waves. Although the 2021 survey was conducted in the post–COVID-19 period, no factors were identified that could compromise data comparability with previous measurement series. In total, 11,764 girls aged 7–15 years living in rural areas of eastern Poland were included in the analyses. The study had a cross-sectional design, with measurements collected at five time points (study waves): 1986, 1996, 2006, 2016, and 2021. Detailed sample sizes by age and study year are presented in Table 1.

Ethical approval. All stages of the study were conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval for the surveys conducted in 1986, 1996 and 2006, was obtained at the project approval stage from the Faculty Ethics Committee within the framework of *State Key Problem 10.7* (1986) and the internal research projects D.S. 49 (1996) and D.S. 203 (2006). Research conducted in 2016 and 2021 was approved by the Ethics Committee of the Józef Piłsudski University of Physical Education in Warsaw (Approval No. SKE 01–13/2014, dated 30 June 2014). Written informed consent was obtained from the parents or legal guardians of all participating children before data collection.

Age assessment. Date of birth was obtained from questionnaires and used to calculate decimal age to two decimal places. Age was defined as the difference between the measurement date and date of birth, and participants were assigned to annual age groups using half-year intervals (e.g., 7.50–8.49 years).

Anthropometric measurements. Anthropometric measurements were performed in accordance with ISAK recommendations. Body height was measured using a GPM Model 101 anthropometer (GPM, Switzerland), and body weight with a SECA 875 electronic scale (SECA GmbH, Germany; accuracy 0.1 kg). Participants were measured barefoot, wearing light clothing, in the anatomical position with the head positioned in the Frankfurt plane. BMI was calculated as body weight (kg) divided by body height squared (m^2). Weight status categories were defined using international BMI cut-off points proposed by Cole et al. [13,14], with underweight subdivided into severe (grades I–II – thinness) and mild (grade III -thinness).

BMI categories and age grouping. To ensure adequate sample sizes and reliable proportion estimates, BMI category analyses were performed in three age groups: 7–9, 10–12, and 13–15 years. For each group, the proportion of girls in individual BMI categories was calculated for each study wave. Due to the lack of individual-level data required for BMI classification, data from 1996 were excluded from BMI category analyses, which were therefore based on the remaining survey years.

Statistical analysis. For body height, body weight, and BMI, arithmetic means and standard deviations were calculated. Differences between the five study waves were assessed using one-way analysis of variance (ANOVA). *Post hoc* comparisons were performed using the Games–Howell test, appropriate for unequal sample sizes and violations of the homogeneity of variance assumption. To describe the overall direction and magnitude of changes over the 35-year period, linear regression analysis was applied. The regression coefficient B represented the average annual rate of change in the studied traits, while the R^2 value indicated model fit and the proportion of variance explained by the variable 'study year'. Differences in the prevalence of weight status categories between study waves were assessed using the chi-square (χ^2) test. The level of statistical significance was set at $p < 0.05$. Statistical analyses were performed using Statistica 13.0 software (StatSoft, Kraków, Poland).

RESULTS

Changes in body height. Mean body height increased systematically across all age groups over the study period (1986–2021), with an average increase of 7.66 cm. The largest long-term increase was observed among 10-year-old girls (9.12 cm), while the smallest increases occurred in the oldest (5.32 cm) and youngest (6.80 cm) age groups. When individual measurement periods were compared, the greatest increment was recorded between 2016–2021 (3.05 cm), whereas the smallest change occurred during 1996–2006 (1.27 cm). *Post hoc* analysis (Games–Howell test) showed that the most pronounced differences were observed between the baseline survey in 1986 and measurements from 2016 and 2021. In the 9–13-year age groups, significant differences were also noted between 1996 and subsequent study waves. Although the intensity of change varied over time, marked increases were evident during 1996–2006, particularly among girls aged 10 and 13 years, followed by another acceleration in 2016–2021, most evident among 9-, 11-, and 13-year-olds. Linear regression analysis confirmed a stable positive secular trend across all age groups. Regression coefficients were positive and statistically significant, ranging from 0.16–0.28 cm per year (1.6–2.8 cm per decade). High R^2 values (0.70–0.98) indicate that the study year explained a substantial proportion of the variability in body height (Fig. 1, Tab. 2).

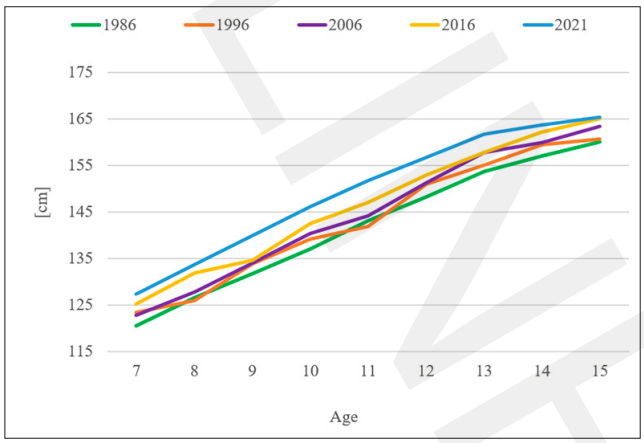

Figure 1. Mean body height (cm) by age among rural girls from eastern Poland across study waves conducted in 1986, 1996, 2006, 2016, and 2021

Table 1. Number of rural girls from eastern Poland included in the study

Age	1986	1996	2006	2016	2021	Total
7	67	66	57	203	841	1,241
8	85	75	104	205	779	1,256
9	103	102	126	221	785	1,346
10	141	75	230	445	751	1,652
11	152	68	234	394	697	1,556
12	168	77	250	558	550	1,615
13	162	132	193	300	363	1,163
14	141	94	228	213	227	917
15	281	65	249	259	149	1,018
Total	**3,286**	**2,750**	**3,677**	**4,814**	**7,163**	**1,1764**

Changes in body weight. Mean body weight differed significantly between successive study waves. Over the entire period 1986–2021, mean body weight increased by 7.03 kg. A slight decrease was observed between 1986–1996 (–0.47 kg), followed by a consistent increase from 1996 onwards across all age groups. The magnitude of change was more heterogeneous than that observed for body height. The largest long-term increases were recorded among 13-year-old (10.84 kg) and 10-year-old girls (8.97 kg), whereas the smallest increases occurred among 15-year-olds (2.10 kg) and 8-year-olds (5.60 kg). *Post hoc* analyses indicated that statistically significant differences occurred primarily between 1986 and later study waves, particularly in comparison with 2016 and 2021. Among girls aged 11–14 years, significant differences were also observed between 1996 and subsequent measurements. The most pronounced increases occurred during 1996–2006, especially among girls aged 10, 11, and 13 years, followed by further acceleration in 2016–2021, most evident among 9-, 11-, and 14-year-olds. Linear regression analysis confirmed a positive trend in body weight over time. Regression coefficients were statistically significant in all age groups except for 14-year-olds, with rates of increase ranging from 0.07–0.30 kg per year. R^2 values (0.42–0.90) indicate good model fit, particularly in younger age groups (Fig. 2, Tab. 2).

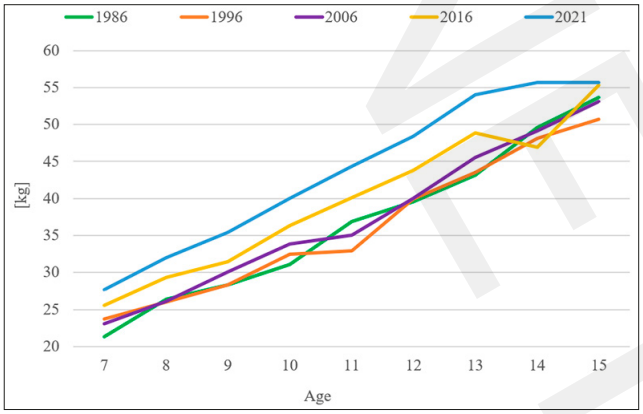

Figure 2. Mean body weight (kg) by age among rural girls from eastern Poland across study waves conducted in 1986, 1996, 2006, 2016, and 2021

Changes in body mass index (BMI). Changes in body height and body weight were also reflected in BMI values; however, BMI showed lower sensitivity to time than the other somatic parameters. Over the entire period 1986–2021, mean BMI increased by 1.37 kg/m^2. The largest long-term increases were observed among 13-year-old (2.28 kg/m^2) and 7-year-old girls (2.26 kg/m^2), whereas the smallest increase occurred among 14-year-olds (0.57 kg/m^2). In contrast, a slight decrease in BMI was observed among 15-year-old girls (–0.59 kg/m^2). Comparisons between successive study waves showed that the largest increase in BMI occurred during 2006–2016 (0.88 kg/m^2), while the smallest increase was recorded in 1996–2006 (0.19 kg/m^2). A slight decline was observed in the first decade (1986–1996; –0.48 kg/m^2). *Post hoc* analyses indicated that BMI values from 1986 differed significantly from those recorded in 2016 and 2021 in most age groups. In girls aged 9–14 years, significant differences were also observed between 1996 and subsequent measurements. Regression analysis confirmed a long-term increase in BMI. The highest rates of change were observed among 10- and 11-year-old girls (B =

Table 2. One-way ANOVA, Games–Howell *post hoc,* and linear regression results for body height, body weight and BMI in rural girls from eastern Poland (1986–2021)

Age	F (p)	Test *post hoc* Games–Howell	B (95% CI)	R^2
		Body height		
7	35.01 (<.001)	1986<1996, 1986<2006, 1986<2016, 1986<2021, 1996<2021, 2006<2021	0.19* (0.13; 0.25)	0.92
8	51.91 (<.001)	1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021	0.24* (0.15; 0.32)	0.90
9	74.13 (<.001)	1986<1996, 1986<2006, 1986<2016, 1986<2021, 1996<2021, 2006<2021	0.23* (0.11; 0.36)	0.81
10	81.92 (<.001)	1986<2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2021	0.26* (0.17; 0.36)	0.91
11	77.12 (<.001)	1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021	0.28* (0.10; 0.46)	0.76
12	55.34 (<.001)	1986<1996, 1986<2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2021	0.23* (0.10; 0.36)	0.80
13	49.01 (<.001)	1986<2006, 1986<2016, 1986<2021, 1996<2006, 1996<2016, 1996<2021, 2006<2021	0.22* (0.11; 0.32)	0.85
14	32.12 (<.001)	1986<1996, 1986<2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2021	0.18* (0.15; 0.22)	0.97
15	33.22 (<.001)	1986<2006, 1986<2016, 1986<2021, 1996<2006, 1996<2016, 1996<2021, 2006<2021	0.16* (0.14; 0.18)	0.98
		Body weight		
7	53.29 (<.001)	1986<1996, 1986<2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.18* (0.11; 0.24)	0.90
8	50.44 (<.001)	1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.17 (0.06; 0.28)	0.76
9	64.71 (<.001)	1986<2006, 1986<2016, 1986<2021, 1996<2006, 1996<2016, 1996<2021, 2006<2021, 2016<2021	0.20* (0.10; 0.31)	0.82
10	70.93 (<.001)	1986<2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.25* (0.14; 0.36)	0.86
11	83.93 (<.001)	1986>1996, 1986>2006, 1986<2016, 1986<2021, 1996<2006, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.26* (0.02; 0.51)	0.59
12	57.82 (<.001)	1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.24* (0.06; 0.43)	0.69
13	53.96 (<.001)	1986<2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.30* (0.14; 0.45)	0.82
14	33.53 (<.001)	1986>2016, 1986<2021, 1996<2021, 2006>2016, 2006<2021, 2016<2021	-0.01 (-0.29; 0.26)	<.01
15	6.69 (0.003)	1986>1996, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021	0.07 (-0.02; 0.16)	0.42
		BMI		
7	27.63 (<.001)	1986<1996, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.06* (0.04; 0.08)	0.92
8	18.10 (<.001)	1986<2021, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.04 (0.00; 0.07)	0.57
9	26.30 (<.001)	1986<2016, 1986<2021, 1996<2006, 1996<2016, 1996<2021, 2006<2021, 2016<2021	0.05* (0.02; 0.08)	0.78
10	32.61 (<.001)	1986<2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.06* (0.03; 0.08)	0.90
11	44.42 (<.001)	1986>1996, 1986>2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.04 (-0.03; 0.12)	0.34
12	32.76 (<.001)	1986>2006, 1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.04 (-0.01; 0.09)	0.50
13	34.31 (<.001)	1986<2016, 1986<2021, 1996<2016, 1996<2021, 2006<2016, 2006<2021, 2016<2021	0.06* (0.02; 0.10)	0.71
14	13.27 (<.001)	1986>1996, 1986>2006, 1986>2016, 1986<2021, 1996<2016, 1996<2021, 2006<2021, 2016<2021	0.00 (-0.05; 0.06)	<.01
15	10.68 (<.001)	1986>1996, 1986>2006, 1986>2016, 1986>2021, 1996<2016, 1996<2021	-0.02 (-0.05; 0.01)	0.39

F – ANOVA test value; p – p-value for the ANOVA test; post hoc Games–Howell test – only statistically significant differences are presented ($p < 0.05$); B – linear regression coefficient; * statistically significant trend ($p < 0.05$); 95% CI – lower and upper limits of the 95% confidence interval for B; R^2 – coefficient of determination of the regression model

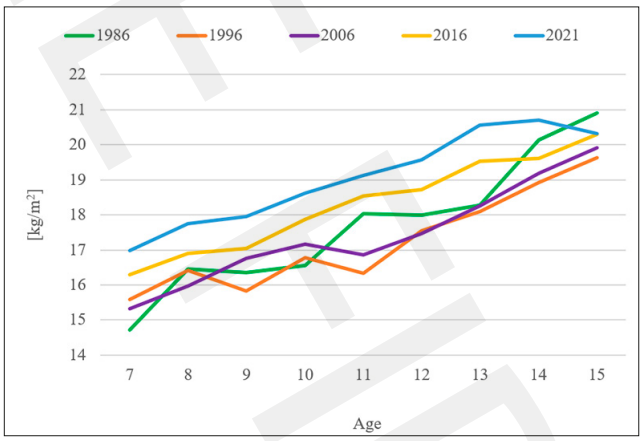

Figure 3. Mean body mass index (BMI, kg/m²) by age among rural girls from eastern Poland across study waves conducted in 1986, 1996, 2006, 2016, and 2021

0.06 kg/m² per year; approximately 0.6 kg/m² per decade). In younger age groups, R^2 values ranged from 0.70–0.92, indicating a strong association between BMI and study year, whereas in older girls lower coefficients of determination (0.31–0.50) suggested greater variability after completion of intensive growth and maturation (Fig. 3, Tab. 2).

Changes in BMI category distribution. Analysis of BMI category distribution revealed a clear shift in nutritional status towards excessive body weight. In all age groups, a systematic increase in the prevalence of overweight and obesity was observed, with the largest increases among the youngest girls (21.21%) and those aged 10–12 years (20.26%), and a smaller but consistent increase in the 13–15-year-old group (8.36%). In contrast, the prevalence of underweight declined only moderately (2.11%, 6.99%, and 0.47% in the 7–9, 10–12, and 13–15-year groups, respectively). Concurrently, the proportion of girls with normal body weight decreased by 19.11%, 13.27%, and 7.89% across the respective age groups, confirming substantial changes in BMI category distribution across study cohorts (Fig. 4, Tab. 3).

Table 3. Chi-square test results for BMI category prevalence across age groups and survey year

7–9 years	**1986–2006**	**1986–2016**	**1986–2021**	**2006–2016**	**2006–2021**	**2016–2021**
severe underweight	2.67	0.01	0.00	1.80	2.58	0.01
mild underweight	0.12	0.02	4.99*	0.14	3.26	1.82
normal weight	2.94	3.09	36.32*	0.00	4.88*	4.95*
overweight	15.89*	9.92*	41.83*	0.45	0.12	1.40
obesity	2.12	37.30*	319.02*	11.23*	90.47*	38.47*
10–12 years	**1986–2006**	**1986–2016**	**1986–2021**	**2006–2016**	**2006–2021**	**2016–2021**
severe underweight	6.34*	1.46	7.16*	0.01	19.18*	6.74*
mild underweight	2.77	5.03*	24.20*	1.08	8.82*	1.52
normal weight	1.26	1.25	15.58*	0.10	6.40*	2.58
overweight	15.69*	15.13*	155.46*	0.97	52.52*	19.46*
obesity	1.15	51.92*	97.78*	31.66*	53.48*	0.09
13–15 years	**1986–2006**	**1986–2016**	**1986–2021**	**2006–2016**	**2006–2021**	**2016–2021**
severe underweight	3.04	2.09	2.10	6.16*	0.19	4.77*
mild underweight	10.42*	4.50*	0.05	16.69*	3.73	3.41
normal weight	0.06	0.14	2.96	0.03	1.97	1.18
overweight	11.96*	2.65	13.68*	15.63*	33.49*	2.61
obesity	2.27	27.53*	28.43*	32.11*	33.03*	0.02

*Statistically significant at $p \leq 0.05$

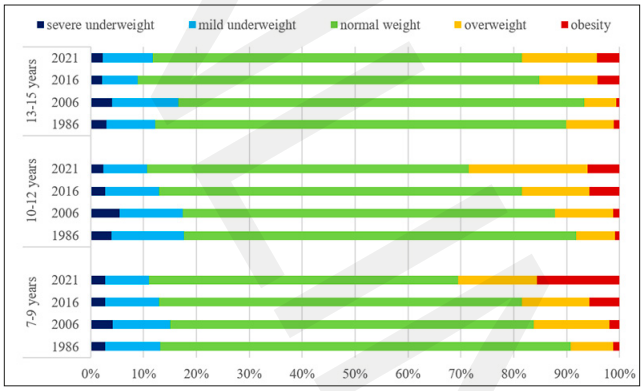

Figure 4. Distribution (%) of body mass index (BMI) categories by age group among rural girls from eastern Poland across study waves conducted in 1986, 1996, 2006, 2016, and 2021

DISCUSSION

The results of this 35-year study indicate that secular processes remain active among girls living in rural areas of eastern Poland, and are closely linked to broader socio-economic transformations in the region. Both body height and body weight increased systematically over the study period, although the pace of change varied across decades and age groups. The smallest increases observed between 1986–1996 likely reflect limited developmental opportunities associated with the difficult economic conditions of the early phase of political and economic transformation, including agricultural restructuring and restricted access to diverse food resources. A marked acceleration occurred after 1996, particularly during the period 1996–2006, when the largest gains in body height and body weight were observed among girls aged 10–13 years. This pattern is consistent with compensatory growth mechanisms described in the literature, whereby rural populations respond to improvements in environmental conditions with accelerated somatic growth [15]. Similar age-specific dynamics have been reported among rural youth in Poland and other European populations [3,16,17].

Changes in BMI were less pronounced than those observed for body height and body weight, reflecting the composite nature of this indicator; nevertheless, the overall direction of BMI trends remained consistent with changes in other somatic parameters. Moderate increases in BMI in younger age groups and relative stabilization or slight decreases among the oldest girls may reflect differences in maturation timing, changes in body composition, or variations in physical activity levels. The BMI trends observed in the present study align with findings from other rural populations undergoing gradual socio-economic improvement, including studies from China, India, and Latin America [4,5,18–20]. In contrast, studies from resource-limited settings indicate that BMI tends to remain stable or increase only slightly, underscoring the role of environmental conditions in shaping somatic development [21,22].

National comparisons remain limited due to the lack of long-term, multi-cohort studies of rural populations in Poland. Available data from central-western and western regions suggest the continuation of secular trends, but differ in temporal scope and socio-economic context, restricting detailed regional comparisons [9,17]. Consequently, these studies provide an important but necessarily general interpretative background for the present findings.

The long observation period also allows consideration of potential cohort and intergenerational effects. Differences in body height, body weight, and BMI between successive cohorts likely reflect the cumulative influence of environmental conditions, including living standards, nutrition, and lifestyle [23–25]. Although the lack of family-based data precludes direct assessment of intergenerational relationships, biological maturation remains an important interpretative factor. Variation in the timing and tempo of puberty may shift mean somatic values between cohorts independently of environmental change, particularly during the peripubertal period.

Environmental transformations, including improvements in nutrition, changes in physical activity, and increased access to health care, likely contributed to the observed cohort differences. In rural populations, such changes may occur later than in urban settings, further increasing heterogeneity between successive cohorts. Thus, the observed patterns probably reflect a combination of secular trends and cohort-specific characteristics.

Limitations of the study. Several limitations should be acknowledged. The study was based on repeated cross-sectional surveys rather than longitudinal follow-up, limiting inference on individual growth trajectories and their relationship with biological maturation. Demographic changes, migration, and socio-economic transformations within rural populations may also have influenced cohort composition over time. Nevertheless, the large sample size, long observation period, and consistent measurement procedures strengthen the reliability of the observed population-level trends.

Overall, the findings should be interpreted as evidence of population-level changes in somatic development rather than individual developmental trajectories. Further longitudinal research incorporating environmental, familial, and behavioural factors is needed to better understand the mechanisms underlying secular trends in rural populations.

CONCLUSIONS

Among girls living in rural areas of eastern Poland, a systematic increase in body height and body weight, accompanied by marked changes in BMI category distribution, was observed over the 35-year study period. The greatest dynamics occurred during the peripubertal period, confirming the high sensitivity of this developmental stage to environmental influences and variability in biological maturation. Across all age groups, the prevalence of overweight and obesity increased, while the proportion of girls with normal body weight declined, and underweight decreased only slightly and unevenly. These findings indicate that rural populations remain highly responsive to changing socio-economic and environmental conditions, and that the observed patterns reflect both secular trends and cohort-specific characteristics. The rapidly increasing prevalence of overweight and obesity, particularly in younger age groups, underscores the need for targeted preventive strategies in rural areas, including health education, promotion of physical activity, and improved access to paediatric and dietary care. Without the implementation of such measures, the risk of long-term metabolic consequences in adulthood is likely to increase.

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