

Growth Monitoring Gaps Among Preschool Children in Tripoli, Libya: A Cross-Sectional Study

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Abstract

Routine anthropometric assessment can identify abnormal growth trajectories before they become clinically apparent, yet information on the coverage of height-and-weight measurement among preschool children in Libya is scarce. This study assessed recent growth monitoring among kindergarten-enrolled children in Tripoli. It examined child, household, and service-access characteristics associated with having both height and weight measured at a health centre during the previous six months. Data were drawn from a cross-sectional study of 131 eligible children aged 24–60 months conducted across Tripoli between November 2025 and April 2026. Caregiver questionnaires were linked to standardised anthropometric measurements. Recent growth monitoring was defined as caregiver-reported height and weight measurements at a health centre within the preceding six months. Of the 131 children, 129 had complete outcome data (two had missing outcome information and were excluded from outcome analyses); 52 of these 129 had been monitored (40.3%; exact 95% CI 31.8–49.3), leaving a monitoring gap of 59.7%. Although 123/129 children (95.3%) lived within 30 minutes of a health centre and 91/128 (71.1%; one child had missing data) reportedly received regular health care, only 44/91 (48.4%) of those receiving regular care had recent anthropometric measurements. Among children classified as stunted, 8/23 (34.8%) had been monitored. Regular health-care attendance was associated with recent measurement in unadjusted analysis (OR 4.01, 95% CI 1.60–10.06; n=128), although this variable was not entered into the primary multivariable model because the questionnaire item itself referenced growth monitoring/vaccinations. In the adjusted model (n=126 complete cases; three children with missing household income excluded), none of the prespecified demographic or access variables showed a statistically significant independent association with recent monitoring. The findings indicate that physical proximity to services does not translate reliably into routine anthropometric surveillance. Integrating standardised height and weight measurement into preschool and primary-care encounters may reduce missed opportunities for early detection of growth problems in Tripoli.

Keywords: Growth Monitoring; Preschool Children; Anthropometry; Primary Health Care; Stunting; Tripoli

Introduction

Assessment of child growth is a basic component of preventive paediatric care. The World Health Organisation (WHO) Child Growth Standards provide internationally accepted references for length/height-for-age, weight-for-age, weight-for-length/height and body mass index-for-age from birth to 60 months. These standards permit abnormal growth patterns to be recognised in relation to age and sex rather than relying on visual impression alone [1]. WHO guidance on growth assessment emphasises accurate measurement of both weight and length or height, interpretation against appropriate standards, and counselling or referral when abnormal patterns are identified [2]. Height measurement is particularly relevant in preschool children because linear growth failure may be missed when clinical attention is directed mainly towards body weight. WHO guidance for children younger than five years presenting to primary health-care facilities recommends measurement of both weight and height so that nutritional status can be assessed more comprehensively [3]. Linear growth impairment can result in an apparently acceptable body mass with height; weight alone thus does not detect all the clinically significant growth issues.

Growth monitoring is broader than measurement itself. Good programmes are associated with repeated anthropometry and interpretation, communication with caregivers and action during the detection of a problem. A long-standing review of growth monitoring and promotion programmes found that impact depended on coverage, health-worker performance, counselling quality and the availability of effective follow-up services [4]. Primary-care studies have likewise shown that recommended growth-monitoring practices are not always implemented consistently, even where children have regular contact with health professionals [5]. More recent evidence from low- and middle-income settings continues to identify substantial gaps in growth-monitoring utilisation and wide variation between populations. A 2024 systematic review and meta-analysis of studies from Ethiopia estimated pooled growth-monitoring and promotion utilisation at 25.7%, with utilisation associated with maternal education, counselling, postnatal care, knowledge and possession of child health records [6].

Accessibility of services is not the only part of uptake. In Ethiopia, the distance to a health facility was shorter in the north, and this was linked to increased use of growth-monitoring services, although knowledge of the caregivers, counselling and prior use of maternal health services had an effect. These results imply that a child can be residing near health services without necessarily being fully anthropometrically assessed. Simultaneously, current methodological research advises that measurement should not be equated with effective screening: the serial data needs to be gathered properly, interpreted correspondingly, and correlated with action [8]. The problem is topical in Libya, where previous national research reported chronic linear growth failure and significant regional differences in childhood nutritional conditions. The current state of child health and nutrition surveillance has brought back the interest in national data on children;

nevertheless, there is still a dearth of published data on the coverage of routine height-and-weight measurements in preschool children. The current analysis is then based on an applicable health-service question in the context of a larger investigation of stunting in Tripoli: what percentage of preschool children had both weight and height measured in a health centre in the last six months, and which child, socioeconomic, and service-access variables were related to that measurement? We theorised that current growth surveillance would be incomplete despite the strong geographic proximity to health facilities and that utilisation would be different according to the child's age, status of growth, maternal education, household income, and access to care.

Methods

Study design and setting

A descriptive-analytical cross-sectional study was conducted among preschool children in selected kindergartens in Tripoli, Libya. Field activities were undertaken from November 2025 to April 2026 as part of a wider project examining stunting and its nutritional, socioeconomic, environmental, and biological determinants. The manuscript was prepared in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for cross-sectional studies [11].

Tripoli kindergartens were used as the operational sampling frame because they provided structured access to children aged 24-60 months and their caregivers. The participating kindergartens were distributed across several Tripoli municipalities and were intended to capture children from varied household and environmental backgrounds. Because children who were not enrolled in kindergarten were outside this sampling frame, the study does not represent every preschool child living in Tripoli.

Participants and sampling

A kindergarten-based municipal coverage approach was used. A total of 701 children were initially screened and anthropometric measurements were obtained during kindergarten visits. Parent or caregiver questionnaires were returned for 382 children (response rate 54.5%). Following the correct age calculation and the use of the study eligibility criteria, 251 respondents were excluded since they were either below or above the prespecified age (24-60 months). The study sample included 131 children of appropriate age and with adequate questionnaire and anthropometric data.

The criteria used to select the children were as follows: children aged between 24-60 months and enrolled in a participating kindergarten with written parental or guardian consent and able to undergo standardised anthropometric measurements. Exclusion criteria were known congenital anomaly, genetic syndrome or severe chronic disease expected to affect linear growth independently of nutritional status, withdrawal or absence of consent, missing essential study information, or a condition preventing reliable anthropometric measurement.

Collection of data and anthropometry

A well- designed caregiver questionnaire captured child demographic factors, birth history, feeding habits, family socioeconomic status, environmental factors, sleep, morbidity, existing access to health care, and prior developmental evaluation. Direct measurements were done at kindergarten visits in terms of height and weight through the use of standardised procedures. Without shoes, children were measured standing upright, heels firmly together, knees straight, shoulders loose, and head as far as possible in the Frankfurt horizontal plane. Measurements were first verified to be complete and plausible before analysis.

Height-for-age z-scores were interpreted as per the WHO Child Growth Standards. Stunting was defined as a z-score of height-for-age less than -2 standard deviations. [1] In the current paper, stunting was considered as a binary trait (stunted versus not stunted) since use of recent growth monitoring, and not nutritional-status classification, were the main outcomes.

Main outcome and explanatory variables

The first result was the recent growth tracking, which was operationalised as a caregiver response of yes to a questionnaire item that inquired whether the child had his height and weight checked at a health centre in the last six months. This definition reflects recent anthropometric monitoring, not the full process of growth monitoring and promotion, which would additionally require serial plotting, interpretation, counselling and follow-up. The outcome was missing for two of the 131 children; these children were excluded from all outcome analyses, leaving 129 children as the denominator for monitoring coverage.

Prespecified explanatory variables were child age, sex, stunting status, low birth weight (<2.5 kg), maternal education, household income, exposure to conflict or displacement, proximity to a health centre, and receipt of regular health care. Maternal education was collapsed into tertiary education (university or postgraduate) versus secondary education or lower. Household income was grouped as >2000 Libyan dinars per month versus ≤2000 dinars per month. A health centre was considered geographically accessible when reported to be within 30 minutes of the household.

The questionnaire item on regular health care was worded as regular care for "growth monitoring/vaccinations". Because this wording partly overlaps conceptually with the primary outcome, regular health care was analysed descriptively and in

unadjusted comparisons but was deliberately excluded from the primary multivariable regression model to avoid circular interpretation.

Statistical Analysis

Analyses were reproduced from the source study workbooks using Python 3.13.5, with statsmodels 0.14.6 and SciPy 1.17.0. Means and standard deviations were used to summarise continuous variables, whereas counts and percentages were used to summarise categorical variables. Key coverage proportions were determined with exact binomial 95% confidence intervals. The Welch t-test was used to compare the age of children in the groups and chi-square tests with the Yates correction for the binary categorical variables; in the case of small expected cell counts, the Fisher exact test was used to compare the groups. All tests were two-sided, and a p-value below 0.05 was regarded as significant.

A prespecified multivariable logistic regression model estimated adjusted odds ratios (AORs) for recent growth monitoring. The model included child age (expressed per six-month increase), sex, stunting status, maternal tertiary education, household income >2000 LYD and proximity to a health centre. Low birth weight and conflict/displacement exposure were examined in bivariate comparisons only and were not entered into the multivariable model. These variables were selected on conceptual grounds relevant to service use and growth surveillance rather than by automated p-value selection. The adjusted analysis used complete cases (n=126; 129 children with outcome data minus three with missing household income, the only model variable with missing values). Crude odds ratios were calculated using all children with available data for each predictor (n=129, or n=126 for household income). Variance inflation factors for model predictors were all <1.3, providing no evidence of problematic multicollinearity.

Ethical considerations

Ethical approval was granted by the Scientific Research and Ethics Committee, University of Tripoli (SREC-UOT; Ref. No. SREC/010/133) on 19 October 2025. Written informed consent was obtained from parents or legal guardians before any study procedure. Participation was voluntary, confidentiality was maintained using study identification codes, and personal identifiers were stored separately from research data. The study procedures were conducted in accordance with institutional ethical requirements and the principles of the Declaration of Helsinki.

Results

Sample flow and denominators

Among the 701 children screened, 382 (54.5) caregiver questionnaires were returned, and 131 children aged between 24 and 60 months were the final sample of the study, following 251 children who were out of the age group. Two children lacked recent growth-monitoring status (the outcome of interest), so Table 1 uses 129 children as the denominator to all proportions of coverage. Additional item-level missing data included regular health care, one child (n=128; this child was in the monitored group, therefore 51 of 52 monitored children have regular-care data); conflict/displacement exposure, one child (n=128; monitored group); low birth weight, four children (n=125; three monitored, one not monitored); and household income, three children (n=126; two monitored, one not monitored). The only variable in the multivariate model that had missing values was household income; hence the adjusted analysis involved 126 children (50 monitored, 76 not monitored). There were no imputations of missing values. Each estimate is divided by the denominator, which is n/N.

Characteristics and growth-monitoring coverage of the participants

Among the 129 children with complete outcome data, mean age was 49.35±8.27 months and 64/129 (49.6%) were male. One hundred and twenty-three of 129 children (17.8%) were considered stunted. The coverage of height and weight measured at a health centre in the past six months was only 40.3%, with 52/129 children having both height and weight taken (precise 95% CI 31.849.3). Thus, 77/129 (59.7%; 95% CI 50.7–68.2) had not received recent anthropometric measurement. The difference in service access was striking: 123/129 children (95.3%; 95% CI 90.278.3) had their residence within 30 minutes of a health centre, and 91/128 (71.1%; 95% CI 62.478.3) were reported to have regular health care, but recent height-and-weight measurement was under one half of the sample. Out of children who were receiving regular health care, 44/91 (48.4%), had recent height-and-weight measurement; i.e., 47/91 (51.6%) of them still had no monitoring as per the study definition even though they were still in touch with services on a regular basis. Out of 37 children who had no regular health care, 7/37 (18.9) had recent measurement. These values are percentages of rows (coverage of monitoring in each care group) of one 2x2 table (n=128): monitored and receiving regular care, 44; not monitored and receiving regular care, 47; monitored and not receiving regular care, 7; not monitored and not receiving regular care, 30. The same data are reported in Table 1, as a percentage of column percentages, i.e., the proportion of monitored children (44/51, 86.3%) and of non-monitored children (47/77, 61.0%) who received regular care; and the denominator (51) of monitored children corresponds to the percentage of one monitored child missing regular-care data. The crude association between regular health care and the recent measurement was 4.01 (95% CI 1.6010.06; Yates-adjusted chi-square= 0.004, as in Table 1). Since the regular-care question in itself mentioned growth monitoring/vaccinations, this estimate is reported as a service-contact gradient, but not as a causal association of its own.

Recent measurement was also reported as 8/23 stunted children (34.8; exact 95% CI 16.457.3) versus 44/106 non-stunted children (41.5%); this was not found to be significant (p=0.718). Table 1 shows that the percentages of children who were

monitored and those who were not monitored and were stunted were 8/52 (15.4%) and 15/77 (19.5%), respectively. Children who already showed stunting were thus more likely to have received recent anthropometric monitoring in these data.

Bivariate and adjusted associations

Children who had growth monitoring in the past were a little older than those who did not have recent monitoring (50.98±6.84 versus 48.25±8.99 months; Welch t-test=0.052). There were no significant differences by sex, stunting, low birth weight, maternal tertiary education, household income, conflict/displacement exposure, or geographic closeness to a health centre (Table 1).

Table 1. Characteristics of children by recent height-and-weight measurement status:

Characteristic	Overall (N=129)	Monitored (n=52)	Not monitored (n=77)	p-value	Missing, n
Age, months, mean ± SD	49.35 ± 8.27	50.98 ± 6.84	48.25 ± 8.99	0.052	0
Male sex	64/129 (49.6%)	28/52 (53.8%)	36/77 (46.8%)	0.541	0
Stunted (HAZ < -2 SD)	23/129 (17.8%)	8/52 (15.4%)	15/77 (19.5%)	0.718	0
Low birth weight (<2.5 kg)	19/125 (15.2%)	10/49 (20.4%)	9/76 (11.8%)	0.295	4
Maternal tertiary education	109/129 (84.5%)	46/52 (88.5%)	63/77 (81.8%)	0.439	0
Household income >2000 LYD/month	41/126 (32.5%)	16/50 (32.0%)	25/76 (32.9%)	1.000	3
Conflict/displacement exposure	13/128 (10.2%)	5/51 (9.8%)	8/77 (10.4%)	1.000	1
Health centre within 30 minutes	123/129 (95.3%)	51/52 (98.1%)	72/77 (93.5%)	0.400	0
Regular health care†	91/128 (71.1%)	44/51 (86.3%)	47/77 (61.0%)	0.004	1

Values are n/N (%) unless otherwise stated, where N is the number of children with non-missing data for that characteristic within the column group; percentages in the Monitored and Not monitored columns are column percentages (proportion of that group with the characteristic), not monitoring coverage. Column headers give the number of children with outcome data (N=129; 131 eligible children minus two with missing outcome). The “Missing, n” column gives the number of the 129 children with missing data for that characteristic. p-values are from Welch’s t-test for age, chi-square tests with Yates’ correction for binary categorical variables, or Fisher’s exact test when expected counts were small. †The regular-health-care questionnaire item explicitly referred to “growth monitoring/vaccinations”; it was therefore not included in the primary adjusted model. Monitoring coverage within regular-care groups (row percentages): 44/91 (48.4%) among children receiving regular care and 7/37 (18.9%) among those not receiving regular care.

In the main multivariate analysis (n=126), none of the prespecified predictors were statistically significant independent predictors of recent growth monitoring (Table 2). Six-month age difference was related to increased adjusted odds of monitoring (AOR 1.32, 95% CI 0.98–1.79; p=0.072), although the null was contained in the confidence interval. Monitoring was also more highly estimated in children living within 30 minutes of a health centre (AOR 4.50), but this estimate was very imprecise (95% CI 0.50–40.73; p=0.181) due to the low number of children (six) who reported living more distant. Stunting itself was not associated with increased monitoring (AOR 0.60, 95% CI 0.21–1.69; p=0.332). The general trend would thus indicate a widely spread service-delivery gap as opposed to a gap that is confined within a specific demographic subgroup.

Table 2. Logistic regression for recent height-and-weight measurement at a health centre:

Predictor	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Age, per 6-month increase	1.29 (0.98–1.71)	0.069	1.32 (0.98–1.79)	0.072
Male sex	1.33 (0.66–2.69)	0.430	1.47 (0.66–3.30)	0.347
Stunted	0.75 (0.29–1.93)	0.552	0.60 (0.21–1.69)	0.332
Maternal tertiary education	1.70 (0.61–4.77)	0.310	1.20 (0.38–3.76)	0.756
Household income >2000 LYD/month	0.96 (0.45–2.06)	0.916	0.97 (0.41–2.28)	0.948
Health centre within 30 minutes	3.54 (0.40–31.23)	0.255	4.50 (0.50–40.73)	0.181

Outcome coded 1 recent monitoring. The adjusted model used complete cases, n=126 (50 monitored, 76 not monitored); three of the 129 children with outcome data were excluded because of missing household income. Crude odds ratios used all children with available data for each predictor (n=129 for age, sex, stunting, maternal education and proximity; n=126 for household income). OR, odds ratio; CI, confidence interval; LYD, Libyan dinars. Regular health care was not included in

the adjusted model because its questionnaire wording partly overlapped with the outcome. Low birth weight and conflict/displacement exposure were examined in bivariate comparisons only (Table 1).

Discussion

In the current study, a huge disparity was established between the availability of health services and the reality of anthropometric observation of preschool children in Tripoli. The proportion of children with complete data whose height and weight had been measured at a health centre in the past six months was less than half, although nearly all of them resided within 30 minutes of a facility, and over seven in ten reported being receiving regular health care. The clinical implication of the finding is that the WHO growth evaluation is based on proper measurement and interpretation of weight and length/height; geographic access and exposure to health services do not ensure that growth evaluation is done. [2,3] Monitoring coverage of 40.3% as observed cannot be mechanically compared with growth-monitoring and promotion estimates of younger children in other countries since the definitions of the programmes, age groups and service structures vary. However, incomplete uptake is widespread as indicated by the broader literature. The Ethiopian meta-analysis (2024) found pooled utilisation of 25.7% among children younger than two years, with a large heterogeneity among the studies. Access, counselling, knowledge and contact with maternal health services are the determinants of service utilisation and Dagne and colleagues also discovered that distance alone did not influence service utilisation. The physical proximity in the current preschool sample was almost universal, but the monitoring was not complete. This trend indicates an implementation in encounters, regardless of whether measurement is regularly carried out, documented and acted upon or merely lack of proximity of facilities.

The distinction between access and delivery is reinforced by the regular-health-care findings. Children reported to receive regular care were more likely to have recent anthropometry than controls not receiving regular care, but only 48.4% of the regular-care group had height and weight measured in the past six months. Since the questionnaire question regarding regular care encompassed the concept of growth monitoring/vaccinations, the strong unadjusted association cannot be considered as a determinant on its own. It does demonstrate, though, that even a general measure of preventive contact was not associated with consistent anthropometric measurement. This is similar to issues of apprehension in previous programme appraisals, in which developmental tracking operational constraints, inconsistent implementation and lack of linkage between assessment, therapy and intervention. [4]

Among the more worrying results was the lack of preferential monitoring between children with stunting. Only 34.8% of stunted children with complete outcome information had received recent height-and-weight monitoring was not predicted by measurement and stunting in the adjusted model. The outcome of the cross-sectional data is that children with disrupted linear growth are not being identified more often by regular measurement, although cross-sectional data cannot determine whether stunting pre- or post-dates the missed monitoring opportunity. Previous Libyan studies have reported stunting and its various biological, socioeconomic, and environmental predictors such as low birth weight and unfavorable household environments. An opportunity to identify growth faltering, consider contributing factors, and organize nutritional or medical follow-up can be provided by routine measurement, although not all such exposures can be prevented. It is a valuable viewpoint that is added by the preschool age of this cohort. A large part of the growth-checking and promotion literature targets infancy and the initial two years of life, during which the rate of growth and nutrition are maximum. Vulnerability is greatest. In comparison, the children in this analysis were around 49 months old.

WHO guidelines are followed up to 60 months, and anthropometric assessment is guided by primary care during the under-five years. [1,3] A preschooler can present well and be taken to care to receive a vaccination, minor illness or administrative leave, as a constant height deficit is not recorded. Serial height measurement is, therefore, applicable not only to undernutrition but also to the identification of endocrine, gastrointestinal, genetic or other causes of poor linear growth as clinically indicated. The adjusted model failed to clearly define a high-risk group in terms of failure to monitor. This adverse result is not to be interpreted as the fact that demographic and socioeconomic factors do not matter. The sample was small, and there were a few categories with low density, and confidence intervals, especially in proximity to health centres, were broad. The lack of powerful independent predictors could also indicate that the monitoring gap falls across household groups. A universal process measure can be more suitable than highly-targeted screening; however, as viewed through the lens of service design, all preschool children coming to primary care should have their weight and height measured with age- and sex-specific interpretation, and further examination should be performed on those children whose measurements or trends warrant concern.

Meanwhile, the quality of measurement and clinical response is important. Modern arguments against growth. Monitoring note: serial anthropometry is not necessarily a good solution to inaccurate diagnosis or improved results in case of inaccurate measurements, inappropriate intervals, misinterpreted growth charts or poor referral pathways. [8] The review by Ashworth and colleagues also concluded that most of the time monitoring is helpful when coupled with effective counselling and health or nutrition action. [4] The connotation to Tripoli is not merely to add more measurements, but to standardize the entire pathway: proper method, plotting or electronic calculation, interpretation, communication with caregiver, repeat examination where appropriate, and referral where appropriate to persistently growing abnormality. Both primary-care and kindergarten settings could be fairly used to implement it. Kindergarten-based measurement would cover children who might not even have regular preventive visits, but health centres.

surveillance would allow clinical interpretation and referral. A common child growth record in either paper or electronic form would help minimize duplication and enable measurements in various settings to add to a longitudinal trajectory. Any such programme must outline equipment requirements, employee training, calibration, referral levels and audit indicators. One of the practical quality indicators might be the proportion of children whose height and weight are reported in a specified range. The distinction between clinical growth monitoring and nutritional surveillance is also demonstrated in this study. Population surveys characterise prevalence on a group basis; individual monitoring seeks to identify deviations in a specific child over time. Libya has historical national data on childhood stunting [9,10], while newer national survey systems provide broader population-level information. These functions are complementary. Population surveillance can identify geographic or socioeconomic patterns, whereas routine clinical or preschool measurement can identify children who require assessment. Strengthening the latter would add an individual-level layer to existing nutrition surveillance rather than replace it.

Limitations

This current research has a number of limitations. To begin with, the sampling frame was limited to children in kindergarten. It did not sample non-formal kindergarten preschoolers, which may have included more deprived groups, and this limits the generalisation to all preschoolers in Tripoli (24-60 months old). Second, 54.5 percent of the children who were first screened took caregiver questionnaires, leaving an opportunity for nonresponse bias. Third, recent growth measurement has been informed by caregiver report as opposed to verification by child health records; thus, there is potential recall or social-desirability error. Fourth, the outcome was a measure of whether height and weight had been measured in the last six months in a health centre. It failed to define the number and/or time of serial measurements, whether measurements were plotted on a growth chart, whether equipment and technique were standardised, or whether counselling and referral were followed. To this end, the result can be best translated to recent anthropometry monitoring instead of full growth monitoring and encouragement. Fifth, two children were missing outcome data and a number of covariates contained small values of missingness; complete-case modelling trimmed down the adjusted sample to 126. Finally, the study was not powered in the first place to determine the determinants of growth-monitoring utilisation. The broad confidence limits and low accuracy of sparse categories of exposure, especially those that have few living over 30 minutes from a health centre. Fifth, two children out of 131 were missing (leaving 129), and a few covariates (low birth weight, four; household income, three; conflict/displacement exposure, one; regular health care, one) had some amount of messiness (complete-case modelling omitted three additional children with missing household income); the adjusted sample was 126. Lastly, the research did not have sufficient power to determine the determinants of growth-monitoring utilisation. The wide confidence and low precision were associated with sparse exposure categories, particularly the few (six out of 129) who dwelled over 30 minutes away from a health centre.

Recommendations and Future Research Directions

Standardised under-five anthropometric check-in should be included in normal preventive and general paediatric check-in at health facilities serving preschool children, and both weight and standing height assessed, compared against WHO standards, and recorded longitudinally. Health activities at kindergarten may be used to supplement this system by detecting children who have not been measured in the recent past and referring them to primary care, as opposed to being a stand-alone screening programme. Future research should (1) conduct a larger population-based survey that includes non-kindergarten-enrolled children; (2) audit health records prospectively to distinguish caregiver-reported measurements from documented serial monitoring; (3) evaluate health-worker, equipment and workflow barriers to routine height measurement; and (4) test a linked kindergarten–primary-care growth-monitoring pathway with predefined referral criteria and process indicators.

A specific follow-up study is proposed: “Towards Routine Preschool Growth Surveillance: A Prospective Implementation Study of Integrated Kindergarten and Primary-Care Anthropometry Among Children Aged 24–60 Months in Tripoli.”

Conclusions

Recent anthropometric monitoring was incomplete among preschool children in this Tripoli kindergarten sample. Only 40.3% (52/129) of children with available outcome data had both height and weight measured at a health centre during the previous six months, despite very high geographic proximity to health facilities and frequent reported contact with health services. Children with stunting were not monitored more often than their peers. The findings support a shift from relying on service availability alone towards embedding standardised height-and-weight assessment, interpretation and follow-up within routine preschool and primary-care encounters. Because the study was cross-sectional and kindergarten-based, the results should be regarded as evidence of a service-delivery gap in the sampled population rather than a city-wide estimate of monitoring coverage.

Ethics Approval and Consent to Participate

Ethical approval was obtained from the Scientific Research and Ethics Committee, University of Tripoli (SREC-UOT; Ref. No. SREC/010/133; 19 October 2025). Written informed consent was obtained from the parent or legal guardian of each participating child.

Funding

This study was self-funded.

Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data supporting the findings of this study are available from the corresponding author on reasonable request, subject to ethical and confidentiality requirements.

Acknowledgements

The authors thank the participating children and their parents or caregivers, as well as the administrations and staff of the participating kindergartens and health institutions that supported data collection.

Author Contributions

H.A. conducted the study as part of her Master's research and prepared the initial manuscript draft. M.A. and A.M. supervised the research and contributed to the critical review of the manuscript.

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