

ORIGINAL ARTICLE

Persian Mobile Applications for Dietary Management: A Quality Assessment Using Mobile Application Rating Scale

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ARTICLE INFO

Keywords:

Mobile applications

Persian

Dietary management

Quality

Mobile application rating scale

ABSTRACT

Background: With the rising prevalence of dietary-related health issues, effective mobile tools are essential for aiding users in managing their nutrition. So, this study aimed to evaluate the quality of Persian mobile applications (apps) designed for dietary management using the Mobile Application Rating Scale (MARS).

Methods: A systematic search identified 340 applications from CaféBazaar and Google Play stores. Applying specific inclusion criteria, 13 apps focusing on dietary management and calorie counting were selected for analysis. Each app's features, user ratings, and functionalities were evaluated.

Results: The analysis revealed that most apps (92.3%) received user ratings above 4 stars, and only one app was entirely free. Collaboration with nutritionists was noted in 23% of the apps. Features included online dietary regimens (77%), calorie counting (77%), and physical activity recommendations (69.2%). The MARS evaluation showed an overall mean score ranging from 2.94 to 4.02, with Mankan achieving the highest score (4.02). Functionality scored the highest among the subscales (3.93), followed by aesthetics (3.78) and engagement (3.32).

Conclusion: Persian mobile diet management apps showed acceptable technical and visual quality; but lacked evidence-based content and interactive features. It seems that collaboration with nutrition experts and enhancing research-based content is crucial to improve their long-term effectiveness.

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Received: April 7, 2026

Revised: July 1, 2026

Accepted: July 9, 2026

Please cite this article as: Khademian F, Masoumi SJ, Hajiani M. Persian Mobile Applications for Dietary Management: A Quality Assessment Using Mobile Application Rating Scale. Int J Nutr Sci. 2026;11(3):568-575.doi: 10.30476/ijns.2026.107837.1525.

Introduction

The past few years have seen the swift integration of digital technologies into the sphere of health and nutrition. Mobile applications that provide diet management, weight control, and healthy eating have become affordable and easy-to-use tools to allow

individuals to control their diets, examine nutrient intake, establish personalized goals, and get real-time feedback (1-3). Evidence from international studies indicates that such applications can improve dietary adherence, support behavior modification, and facilitate long-term health outcomes; when

combined with structured guidance (4).

The rise of locally-created mobile applications has been accompanied by a rise in public awareness about nutrition-related health concerns, such as obesity, metabolic disorders, and lifestyle-related chronic diseases in Iran (5). Such applications are diverse according to the quality of content, their usefulness, and interactivity, and in accordance with evidence-based dietary guidelines (6). Although they are becoming increasingly popular, there is a lack of literature that systematically assesses the efficacy and quality of Iranian diet and nutrition applications, which is a knowledge gap that can impede the ability of users and health care providers to make informed decisions (6, 7).

The Mobile Application Rating Scale (MARS) is one of the most widely used and reliable instruments for assessing the quality of mobile health applications (8). This tool provides a structured approach to evaluate apps across several key domains, including user engagement, aesthetics, functionality, and the quality of informational content (9). The MARS has shown excellent internal consistency and interrater reliability for assessing the quality of mobile health (mHealth) apps (10). Applying the MARS framework to Iranian diet and nutrition applications can help users make evidence-based decisions when choosing effective tools for managing their dietary habits. Moreover, such evaluations offer meaningful feedback for developers, encouraging improvements that align with user needs and scientific standards (11, 12).

The present study aimed to systematically evaluate and rank Iranian mobile applications related to diet, healthy eating, and fitness using the MARS instrument. A selection of the most widely used and highly rated apps on local platforms was assessed according to standardized MARS criteria. This approach enabled identification of high-quality applications suitable for public use, as well as highlighting areas where improvements are needed. The findings of this research are expected to inform users seeking reliable digital tools for diet management and provide actionable recommendations for app developers to enhance scientific rigor and user engagement. Given the increasing prevalence of digital health interventions and their potential to influence dietary behavior and lifestyle choices, this study represented a critical step toward raising the standards of nutrition-related mobile applications in Iran and contributing to the broader field of Mobile Health research.

Materials and Methods

A systematic search was conducted to identify Persian-language mobile applications designed for

dietary management across both the CafeBazaar (most popular Iranian android app store) and Google Play Store between April and May 2025. This review was designed to assess the available apps for diet and to rate their quality using the MARS. The search utilized relevant keywords in both Persian and English related to dietary management (e.g., diet, nutrition, calorie counting) to ensure comprehensive identification of Persian-language dietary management apps.

Apps were included if they were Android-based, available in Persian, primarily addressed nutrition and dietary management and calorie counting, accessible in either the CafeBazaar or Google Play Store, targeted the general population or those seeking to manage their diet. Apps were excluded if they had a user rating below 3 stars or had not been updated within the past year. After initial identification, all apps were screened for eligibility based on the above criteria. Duplicate apps available on both platforms were identified and counted only once in the final analysis. The final sample included only those apps that met all inclusion criteria.

All selected apps were downloaded and installed on Android devices. Each app was independently evaluated by two trained reviewers with backgrounds in health information management and nutrition sciences. Before formal evaluation, raters underwent training on the MARS, including viewing the official training video and discussing sample app ratings to ensure consistency and reliability. Both reviewers separately rated the applications against the MARS criteria. In cases of disagreement between reviewers, discrepancies were resolved through discussion and consensus. Each app was used for a minimum of 30 minutes in real-world conditions. The quality of each app was assessed using the MARS, a validated tool comprising 23 items rated on a 5-point Likert scale (1=inadequate, 5=excellent). The MARS evaluated four objective domains of engagement (including aspects like fun, interactivity, and individual adaptability), functionality (app's performance, ease of use, and navigation features), aesthetics (app's visual appeal, layout, and graphic design), and information quality (accuracy, quantity, and quality of the information presented within the app) as well as subjective quality. To assess the evidence base for each app, a supplementary search was conducted using Google, Google Scholar, PubMed, the developer's website, and the apps store pages to identify any peer-reviewed publications evaluating the effectiveness of the included apps.

Descriptive statistics were utilized to evaluate the MARS scores, which included means and standard deviations (SDs) for each domain score as well as

the overall quality score. To improve the objectivity of the assessment, the means of the subjective quality items were also calculated and analyzed independently. Data analysis was performed using Microsoft Excel and SPSS statistical software to evaluate the quality of the identified mobile applications. In accordance with MARS guidelines, the mean score for each domain was calculated by summing the scores for all items within that domain and dividing by the number of items. The maximum possible scores for each objective quality domain were engagement (25 points), functionality (20 points), aesthetics (15 points), and information quality (35 points). The subjective quality domain had a maximum score of 20 points. This study was approved by the Research Ethics Committee of the Shiraz University of Medical Sciences, Shiraz, Iran (IR.SUMS.SCHEANUT.REC.1404.036).

Results

A total of 340 applications were identified through initial search terms in the CafeBazaar store and Google Play store. By using relevant keywords and specific inclusion criteria; we were able to identify a large number of apps related to this topic. We then conducted a more detailed review of these apps, including an assessment of their features and content, to select a final sample of 13 apps. A total of 13 mobile applications for nutrition and dietary management were included in the final analysis. All selected apps were available in Persian, focused primarily on dietary and nutrition management or calorie counting and met the inclusion criteria.

All the apps included in this review could be freely downloaded by users. Most of the apps received a user rating of more than 4 stars of a total of 5 ($n=12$, 92.3%). There were only 3 apps that used collaboration of at least one nutritionist based on the descriptions provided by the developers ($n=3$, 23%).

Only one app was fully free of charge ($n=1$, 7.7%); while three of the apps supported both Persian and English languages ($n=3$, 23%). Karafs was the most downloaded app ($n>1$ million) followed by Mankan ($n=500,000$), and Zireh ($n=500,000$). The lowest download score was recorded for Fibo ($n=10,000$) (Table 1). All of the 13 apps targeted behavior change, goal setting, and physical health (Table 2). Most of the apps ($n=11$, 84.6%) focused on increasing happiness and well-being, behavioral change and goal setting. The most theoretical background and strategies ($n=11$, 84.6%) used were (i) information and education, (ii) monitoring and tracking, and (iii) goal setting (Table 2).

All of the apps were primarily designed for adults and young adults ($n=13$, 100%); while only one app additionally featured a dedicated section for children under 12 years old. Most of the apps ($n=11$, 84.6%) sent reminders, all apps ($n=13$, 100%) required internet access to function and allowed password protection and required log-in. Two apps ($n=2$, 15.3%) allowed sharing on platforms like Facebook and Twitter (Table 2). Approximately 10 of 13 apps provided an online dietary regimen (77%). Additionally, 10 apps offered calorie counting features (77%), and 9 of them also recommended physical activity (69.2%).

The quality of the included apps was evaluated using the MARS. Table 3 presents the 13 selected apps ranked by decreasing overall quality, accompanied by their scores in the 4 critical subscales of the MARS including engagement, functionality, aesthetics and information quality. The overall and subjective quality scores were also included. The mean overall MARS score across all apps ranged from 2.94 to 4.02 out of 5. The highest overall score was observed for Mankan (4.02), followed by Jazireh (3.96), Barika (3.87), and Behandam (3.78). The lowest overall score was recorded for Stepfit (2.94), Kalampich (3.21), and Boshghab (3.25).

Table 1: Characteristics of the nutrition mobile applications (apps).

App name	Downloads	Rating	Cost	Language	Platform
Mankan	500,000	4.6	In app purchase	Eng/ Fa	ios/ android
Jazireh	100,000	4.6	In app purchase	Fa	Android
Barika	20,000	4.4	In app purchase	Fa	ios/ android
Behandam	100,000	3.8	In app purchase	Fa	ios/ android
Karafs	1,000,000	4.4	In app purchase	Eng/ Fa	ios/ android
Zireh	500,000	4.3	In app purchase	Fa	ios/ android
Sigma	20,000	4	In app purchase	Fa	ios/ android
Energym	200,000	4.3	In app purchase	Eng/ Fa	ios/ android
Gymshow	50,000	4.6	In app purchase	Fa	Android
Fibo	10,000	4.6	In app purchase	Fa	Android
Boshghab	200,000	4.6	In app purchase	Fa	Android
Kalampich	100,000	4.9	free	Fa	Android
Stepfit	20,000	4.6	In app purchase	Fa	Android

Table 2: Description of the nutrition mobile applications (apps) included in the study.

App name	Focus (what the app targets)	Theoretical background/ strategies	Technical aspects of app	Age group
Mankan	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Jazireh	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults, Children (under 12 years)
Barika	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Behandam	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Allows sharing (Facebook, Twitter, etc.), Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Karafs	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Zireh	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Sigma	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Energym	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Gymshow	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Allows sharing (Facebook, Twitter, etc.), Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Fibo	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults
Boshghab	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; advice tips/strategies/skills training; Goal setting	Has an app community, allows password protection; requires log-in; sends reminders; Needs web access to function	Young adults (18-25 years), Adults

Kalampich	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; Goal setting	Has an app community, allows password protection; requires log-in; Needs web access to function	Young adults (18-25 years), Adults
Stepfit	Increase Happiness/ Well-being- Behavior Change- Goal Setting- Physical health	Assessment; feedback; information/education; monitoring/tracking; Goal setting	Has an app community, allows password protection; requires log-in; Needs web access to function	Young adults (18-25 years), Adults

Table 3: Domain and overall scores for each application.

Application name	Objective Quality				Subjective quality	Overall score
	Engagement	Functionality	Aesthetics	Information		
Mankan	3.70	4.65	4.17	3.67	3.65	4.02
Jazireh	3.60	4.38	4.00	3.82	3.15	3.96
Barika	3.50	4.28	4.17	3.50	3.65	3.87
Behandam	3.80	4.13	4.00	3.25	3.50	3.78
Karafs	3.40	4.78	4.00	2.82	3.65	3.76
Zireh	3.60	3.53	3.83	3.30	3.65	3.54
Sigma	3.30	3.53	3.83	3.25	3.13	3.46
Energym	2.80	3.88	4.00	3.00	2.75	3.44
Gymshow	3.40	3.70	3.96	2.72	3.40	3.42
Fibo	3.20	3.75	3.50	3.15	2.63	3.39
Boshghab	3.20	3.65	3.17	3.00	2.28	3.25
Kalampich	3.10	3.63	3.50	2.67	2.28	3.21
Stepfit	2.60	3.25	3.00	2.92	2.28	2.94

The results of the MARS evaluation revealed that of the 5 subscales, functionality had the highest mean score with 3.93 (SD=0.46); the second subscale was aesthetics with 3.78 (SD=0.37) followed by engagement with 3.32 (SD=0.35), information quality with 3.15 (SD=0.35), and finally subjective quality with the lowest mean score of 3.07 (SD=0.57).

Subscale scores were (i) Engagement scores that ranged from 2.60 (Stepfit) to 3.80 (Behandam), with most apps scoring between 3.10 and 3.80. Apps with higher engagement scores often included features such as personalized feedback, reminders, and interactive elements. (ii) Functionality scores that were generally high, with the top performer being Karafs (4.78), followed by Mankan (4.65) and Jazireh (4.38). Most apps demonstrated reliable performance, intuitive navigation, and ease of use. (iii) Aesthetics scores that were highest for Mankan and Barika (both 4.17), indicating a visually appealing interface and clear layout. Other apps scored between 3.00 and 4.00 in this domain. (iv) Information quality scores that varied with the highest score for Jazireh (3.82) and the lowest for Karafs (2.82). Apps with higher scores provided more comprehensive and evidence-based dietary information, while others offered limited or less detailed content. (v) Subjective quality scores that ranged from 2.28 (Boshghab, Kalampich, Stepfit) to 3.65 (Mankan, Barika, Karafs, Zireh).

User satisfaction tended to be higher for apps with more features and better usability. A supplementary search for peer-reviewed publications evaluating the effectiveness of the included apps did not identify any scientific studies. As a result, none of the apps could be rated for the evidence base item of the MARS.

Discussion

The findings of this study highlight the current state of Persian mobile applications for dietary management, as assessed using the MARS. The results revealed several strengths and areas for improvement, which are discussed in the context of existing literature and similar studies in other domains. The mean overall MARS score for the 13 reviewed apps ranged from 2.94 to 4.02, with an average of 3.32 (SD=0.35). This is comparable to other studies evaluating health-related apps, such as those for diabetes management (mean MARS score of 2.78 (13), Mental Health Apps (mean MARS score of 2.5) (14), and psychological skills training in sports (mean MARS score of 2.78) (15). However, the Persian dietary apps scored slightly higher, suggesting a relatively better quality in terms of engagement, functionality, and aesthetics.

Engagement scores varied widely (2.60–3.80), with apps like Behandam (3.80) and Mankan (3.70)

performing well due to features like personalized feedback and reminders. This aligns with findings from Bonetti *et al.*, where engagement was a critical factor in app usability (15). However, the lower scores in some apps indicated a need for more interactive and gamified elements to enhance user retention, as suggested by Marston and Hall (16). Functionality was the highest-scoring subscale (mean of 3.93, SD=0.46), with apps like Karafs (4.78) and Mankan (4.65) excelling in performance and ease of use. This mirrors results from Alizadeh-dizaj *et al.* (13), where functionality was also the strongest domain (13). The intuitive navigation and reliability of these apps are crucial for user adherence, as emphasized by Stoyanov *et al.* (9).

The information quality subscale scored moderately (mean of 3.15, SD=0.35), with Jazireh (3.82) providing the most evidence-based content. However, the lack of peer-reviewed evidence for any of the apps is a significant limitation, echoing concerns raised by Bonetti *et al.* and Alizadeh-dizaj *et al.* (13, 15). Incorporating scientifically validated dietary guidelines and collaborating with nutritionists could improve this aspect, as highlighted by Ferrara *et al.* (17). Subjective quality scores were the lowest (mean of 3.07, SD=0.57), indicating room for improvement in user satisfaction. Similar findings were reported in diabetes management apps (13), where subjective quality was often compromised due to poor engagement and lack of personalization.

None of the apps had scientific backing, which undermines their credibility. Future apps should integrate peer-reviewed dietary strategies and involve healthcare professionals in development, as recommended by Gong *et al.* (18). By contrast, in other areas such as stress management and mental health, a randomized controlled trial has demonstrated the significant effectiveness of mobile health applications in alleviating symptoms and improving users' psychological well-being, underscoring the importance of conducting similar rigorous evaluations for diet management applications (19). Features like gamification, chatbots, and social sharing could enhance interactivity, as demonstrated by Haque and Rubya in mental health apps (20).

The most common areas for improvement identified through the MARS assessment were limited user engagement features and insufficient evidence-based content. Enhancing interactivity, personalization, and the inclusion of referenced educational material could further improve app quality. To address these gaps, developers should consider applications with clear, user-friendly interfaces and aesthetically appealing designs to consistently demonstrate higher levels of user

engagement and retention, which are critical for the long-term success of diet management apps (21). Developers are encouraged to prioritize not only visual appeal but also interactive features such as personalized feedback, reminders, and goal-setting tools, which have been shown to significantly enhance user experience (15).

Moreover, applications developed based on scientific evidence have consistently demonstrated higher efficacy in their respective domains, highlighting the crucial role of evidence-based design in enhancing app effectiveness and user outcomes (22). Accurate, comprehensive, and evidence-based dietary information is essential to foster user trust and satisfaction. Incorporation of customizable meal plans tailored to individual user needs potentially leveraging artificial intelligence to provide dynamic dietary suggestions can improve app efficacy and competitive advantage (3). Social features, including community forums, group challenges, and shared meal plans, have demonstrated positive effects on motivation and sustained engagement (23).

Integrating real-time support, such as AI chatbots or consultations with professional nutritionists, has been shown to enhance user retention and satisfaction in mobile health interventions (24). Furthermore, push notifications for meal tracking, progress updates, and new feature announcements effectively maintain consistent app usage and promote long-term engagement (25, 26). These engagement strategies; when combined with personalized feedback, goal setting, and social interaction features; are critical components in fostering sustained user participation and improving health outcomes (21). By addressing these areas, developers can significantly improve both the functionality and appeal of diet management applications, ultimately supporting better health outcomes among users.

This study acknowledges potential limitations, including the lack of long-term user feedback, which restricts insights into the real-world effectiveness of the applications. Additionally, the study was confined to Iranian app stores, limiting the generalizability of the findings to other populations or contexts. Moreover, only Android applications and only freely downloadable apps were evaluated; therefore, the findings may not be generalizable to iOS platforms or to paid applications that require upfront purchase.

Conclusion

Persian dietary management apps demonstrate acceptable functionality and aesthetics (mean MARS score of 3.32). However, they lack evidence-based content and interactive engagement features. No app had peer-reviewed scientific backing, and

information quality scored low (mean of 3.15). Collaboration between developers, nutritionists, and researchers is urgently needed to integrate scientifically validated content, personalized feedback, and gamification. Future randomized controlled trials are required to assess real-world effectiveness on dietary behaviors and health outcomes.

Acknowledgement

The authors would like to express their gratitude to the Research Ethics Committee of Shiraz University of Medical Sciences (SUMS) for their support and approval of this study

Funding

The present article was financially supported by Vice-Chancellor of Research at Shiraz University of Medical Sciences (grants No.29861).

Authors' Contribution

All authors contributed significantly to the conception, execution, and preparation of the study. F.K was responsible for conceptualization, methodology, app identification, independent MARS quality assessment, data analysis, and original draft preparation. S.J.M contributed to conceptualization, project supervision, methodology, resolving consensus on discrepant ratings, and critical revision of the manuscript. M.H participated in app identification, independent MARS quality assessment, data extraction, and contributed to manuscript writing and revisions. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The authors further confirm that they have no commercial associations or affiliations with the developers of the mobile applications evaluated in this study.

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