




Original Research

Factors contributing to pharmacists' intention to provide weight management service in community pharmacy settings: A systematic review

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Abstract

Background: Obesity is one of the health problems which could cause health impacts, as well as economic and social impacts. Community pharmacists are accessible primary health care providers who can play a role in counselling on diet and exercise to control weight and correcting medication misuse for weight control. Literature has shown the effectiveness of weight management services (WMS) provided by community pharmacists, but the percentages of this service provision were low. **Objective:** To systematically review contributing factors for community pharmacists' intention to provide weight management services. **Results:** The systematic review included 3,884 participants from 24 studies. There were four major dimensions of weight management service in community pharmacies: 1) patient recruitment, 2) problem identification and referral, 3) counselling, and 4) monitoring. Pharmacists indicated difficulty in starting a conversation about weight with patients. Most pharmacists performed diet and weight-loss product counselling, but few pharmacists monitored patients' progress and adherence to WMS because of the follow-up difficulty. They recommended the use of mobile applications and social media to facilitate monitoring. Pharmacists viewed that those weight-loss products needed to be better regulated. Therefore, it should be pharmacists' responsibility to correct the irrational use of these products. Pharmacists' authority, inadequate pharmacist staff, lack of patient awareness, patients' demand, and private counselling areas were the barriers to weight management service. Knowledge and training, accreditation, time for pharmacists to study, reimbursement, multidisciplinary collaboration, and health resource support could motivate pharmacists to provide WMS. To start WMS, pharmacists reported the need for knowledge about diet, lifestyle modification, weight-loss products, and improving patient engagement in weight management programs. **Conclusion:** The study provided a conceptual framework for WMS. Most pharmacists had a positive attitude toward and intention to provide WMS. The support of weight management knowledge and skills and resources were needed to start WMS in community pharmacy.

Keywords: weight management; obesity; weight control; pharmacist; pharmacy

INTRODUCTION

Obesity is one of the health problems which has affected many individuals throughout the world. Obesity has been associated with a higher risk of hypertension, coronary heart disease, stroke, diabetes, and metabolic syndrome significantly

compared to people with normal weight.¹⁻³ Obesity has also led to a loss in productivity, absenteeism, and premature mortality. Approximately four million people died from obesity in 2015, which accounted for 7.1% of all-cause mortality worldwide.⁴ With the advent of the COVID-19 pandemic, obesity also poses a threat to those infected with the virus, causing more serious complications.⁵⁻⁷ Several studies reported the economic burden of obesity.⁸⁻¹¹ The global economic burden of obesity was approximately U.S. \$2.0 trillion or 2.8% of the global gross domestic product (GDP).¹ Direct costs of treating obesity and its consequences in Thailand were approximately 5,584 million Baht which accounts for 1.5% of national health expenditure, and the total healthcare costs for obesity were approximately 12,142 million Baht, which was 0.13% of Thailand's Gross Domestic Product (GDP).¹² Besides, a study in China showed that the total, direct, and indirect costs of treating cardiovascular disease occurring from obesity were \$30,350.8 million, \$28,642.5 million, and \$1708.3 million, respectively.¹ The prevalence of obesity at the global level keeps increasing. In 2016, approximately 13% of the world's adult population was obese.¹³ The prevalence of obesity was 32.2%, 26%, and 23.8%, and the prevalence of overweight was 17.1%, 34%, and 17.1% in the U.S.,¹⁴ Australia,¹⁵ and Thailand,¹⁶ respectively. With the increasing prevalence of obesity and its serious health risks and high economic burden, weight management

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to assist in the reduction of obesity is alarming. People in a community normally come to purchase medicines and receive a consultation at pharmacies. Community pharmacists are uniquely positioned by virtue of their ability to have regular contact with patients for prescription dispensing because of the accessibility.¹⁷⁻²⁰ Community pharmacists not only dispense medications for certain diseases and make a referral to a doctor if necessary but also provide education about medications, screening for metabolic syndrome, and counselling on diet and exercise to control weight.²¹ Community pharmacists also help correct misunderstandings about medication use for weight control and improve the quality of care in patients with metabolic syndrome.^{22,23} Furthermore, several studies emphasize that patients are more comfortable talking to community pharmacists than to general practitioners.^{18,24-27} Numerous studies showed the effectiveness of pharmacists in weight management and led to significant weight reductions.²⁸ A scoping review²⁹ showed pharmacists' potential to help reduce weight with a mean weight loss of 3.8 kg. Even though there were various studies on the effectiveness of the community pharmacist in weight management services, the percentages of this service provision have been relatively low.^{24,30-33} Besides, pharmacists' confidence in their ability to deliver weight management service was identified as 'average to low'.²⁵ Pharmacists' intention to provide weight management is needed for society. Contributing factors to pharmacists' intentions were crucial to increasing service provision. Therefore, the objective of the present study was to review contributing factors of community pharmacists' intention to provide weight management services. The results could guide the intervention to promote weight management services in community pharmacies and provide a conceptual framework for future comprehensive research.

METHOD

Data sources and searches

According to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement 2020, the systematic review was conducted.³⁴ The search terms were 'pharmacist weight management'. The search terms were used in five databases which were MEDLINE/ Pubmed, ScienceDirect, Scopus, Cochrane, and APA PsychInfo. The search terms were different among databases. The search flowchart is presented in Figure 1. The EndNote X8 program was used to collect references.

Study selection

After studies were included, the titles and abstracts were screened. The researchers used the inclusion and exclusion criteria to set the boundaries for the systematic review as follows. The inclusion criteria were the studies: (1) about community pharmacists' perception of facilitators and barriers of weight management service and health promotion service related to weight management, (2) written in English, (3) which were retrievable as full text, and (4) met quality assessment criteria. Studies with insufficient data and non-pharmacist staff

were excluded. The researchers included both quantitative and qualitative studies. The screening was performed by one researcher (P.S.) and checked by another researcher (T.K. *). Quality assessment was done independently by two researchers (P.S. and S.M.T).

Data extraction

Data extraction was performed by P.S. and T.K.*, and the extracted data included the following topics; 1) The percentages of pharmacists who expressed attitude towards obesity, weight loss products, pharmacists' responsibility in weight management service, outcomes of service, 2) the percentages of pharmacists who expressed an opinion on perceived barriers and motivators, which would affect the intention to provide weight management service, 3) levels of comfortability and confidence to provide service, in forms of percentages and Mean \pm S.D. 4) the percentages of practice, 5) pharmacists' willingness to recruit, counsel, and start weight management service in forms of percentages and Mean \pm S.D., 6) the percentages of pharmacists who had experience in training about weight management in either undergraduate or postgraduate training programs, and 7) the percentages of pharmacists who expressed an opinion on needs for future training. Data on characteristics, such as authors, published year, setting, number and age of participants, were also extracted.

Quality assessment

The quality of Included studies was assessed by Quallsyst, developed by Kmet, Lee, and Cook.³⁵ The criteria consist of the checklist for assessing the quality of both quantitative and qualitative studies. Reporting scores were defined as follows; 0= not appropriate, 1= partially appropriate, 2= totally appropriate, and N/A = not applicable. Two researchers (P.S. and S.M.T.) independently performed the quality assessment to prevent bias, and then the average scores from each reviewer were calculated and shown in Appendix A and B, ranging from 0 and 1. Studies with a quality score of ≥ 0.75 were considered appropriate to be included in the systematic review since the cut point of ≥ 0.75 was proven appropriate in previous literature.³⁶

Data analysis

Extracted data were analyzed by two researchers (P.S. and T.K. *) using the Microsoft Excel program[®]. The summary of study characteristics is offered in Table 1. Later, the conceptual framework of factors affecting the intention to provide WMS was developed.

RESULTS

The search resulted in 2,152 studies from five databases. When 486 duplicates were removed, there were 1,666 remaining studies. After title and abstract screening, 1,637 studies were excluded because they were not relevant to the intention to provide weight management services. Subsequently, 37 studies were retrieved for inclusion criteria assessment. One study was not retrievable in full text. Of 36 studies, 12 studies did not meet



the inclusion criteria because they focused on effectiveness or intervention. Eventually, there were 24 studies to examine for quality assessment on methodology. Of all 24 studies, 13 were quantitative studies, 10 were qualitative studies, and one was a mixed-method study. The PRISMA flowchart is shown in Figure 1.

Quality assessment results

According to the QualSyst tool, all the included studies met the quality assessment criteria with scores equal to or above 0.75. The 13 studies were assessed by the checklist for assessing the quality of quantitative studies, ten studies were assessed by the checklist for assessing the quality of qualitative studies, and one mixed-method study was assessed by both checklists. The scores are provided in Appendix 1.

Study characteristics

Of all 24 studies included in the systematic review, 3,682 participants were surveyed in the quantitative studies, and 202 participants were interviewed in the qualitative studies. The response rates of quantitative studies ranged from 33.6% to 93.6%. The number of participants in the quantitative part ranged from 51 to 550, and in the qualitative part ranged from 10 to 31. Four studies were conducted in Australia,³⁷⁻⁴⁰ four studies in U.K.,^{27,29,30,41} four studies (11.76%) in Malaysia,^{24,42-44} two studies in the U.S.,^{26,45} two studies in Kuwait,^{46,47} two studies

in Saudi Arabia,^{48,49} and the remaining studies took place in New Zealand,²⁵ Qatar,⁵⁰ Pakistan,⁵¹ Egypt,³¹ Lebanon,³² and UAE⁵² All studies took place in the community pharmacy sector. The participants' ages ranged from 20 to 60 years and older. The summary of study characteristics is shown in Table 1.

Weight management service (WMS) by community pharmacists

Several articles affirmed that pharmacists played a role in multidisciplinary healthcare teams in weight management service.^{25,32,39,46,47,50,51,53} Activities in WMS from all included studies were systematically categorized into four dimensions, including 1) patient recruitment, 2) problem identification and referral, 3) counselling, and 4) monitoring.

Patient recruitment

In the U.S., 42.9% of pharmacists were comfortable recruiting patients with obesity for a weight management program.³³ However, there was difficulty in starting a conversation to recruit patients because patients did not show a demand.^{29,54} Two qualitative studies indicated that pharmacists feared causing patient offence when they attempted to recruit cases of overweight and obesity.^{25,29} A qualitative study in New Zealand²⁵ reported that pharmacists tended not to be proactive in recruiting patients for weight control because it was a sensitive issue. In addition, a study in the U.K. confirmed that

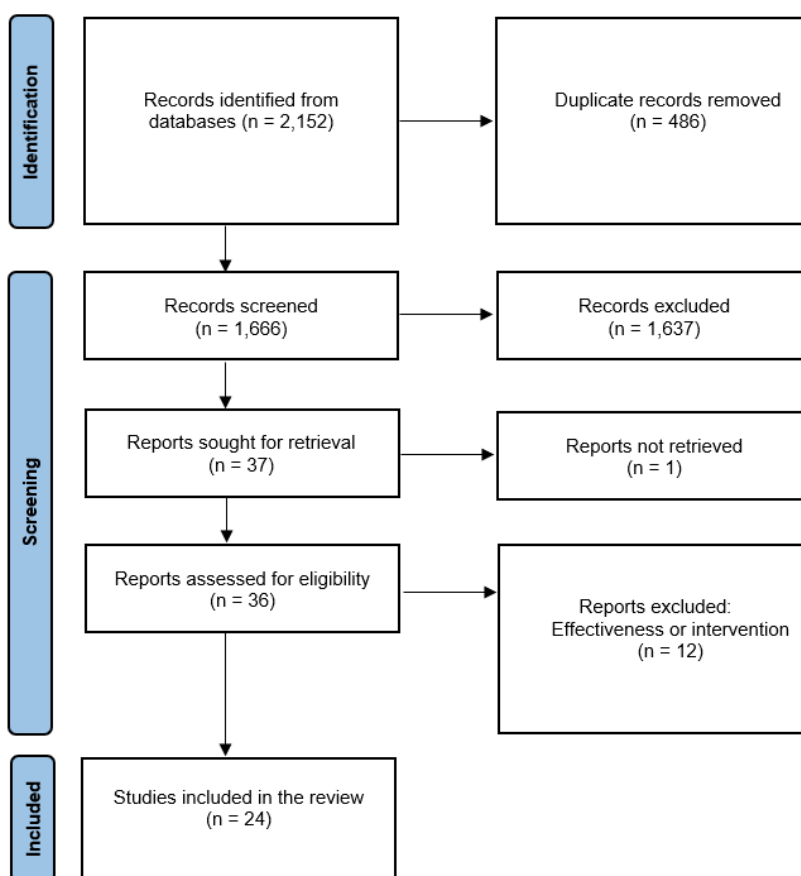


Figure 1. PRISMA flow chart of included studies in the review

| Table 1. Summary of study characteristics | | | | | | | | | |
|---|-----------------|------------------------|-------------------------------------|---|---|--|---|--|--|
| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators | |
| Quantitative studies | | | | | | | | | |
| 1. M. Medhat et al, 2020 ³¹ | Egypt | Cross-sectional survey | 368 (73.6%) | N/A | <p>Weight management counselling:</p> <ul style="list-style-type: none"> - Nutritional advice upon customer request (88.6%), based on pharmacists' observations (34%), and doctor's diagnosis (20.1%) | <p>Towards WMS:</p> <ul style="list-style-type: none"> - Medical nutrition therapy was a part of a pharmacist's duties (69.3%) - Therapeutic nutrition was more important than drugs in some conditions (22.8%) | <ul style="list-style-type: none"> - Lack of pharmacists' expertise in nutrition counselling (87.2%) - Lack of support from the pharmacy management for counselling activities (26.1%) - Lack of private consultation areas (11.4%) - Lack of pharmacy staff (8.2%) | <ul style="list-style-type: none"> - Equipment, such as weighing scale (98.9%) - Training in medical nutrition therapy (95.4%) - Communication skills (13.6%) - Reimbursement (12.2%) | |
| 2. Mohamad Ali Hijazi et al, 2020 ³² | Lebanon | Cross-sectional survey | 383 (89%) | <ul style="list-style-type: none"> ≤ 40 (66.4%), ≥ 41 (33.5%) | <p>Problem identification and referral:</p> <ul style="list-style-type: none"> - Weight measurements (79.8%) - Height measurements (58.0%) - BMI calculation (39.8%) - Body fat measurement (15.5%) - W.C. measurements (10.8%) <p>Weight management counselling:</p> <ul style="list-style-type: none"> - PA counselling (91.7%) - Diet counselling (86.3%) - Weight loss products dispensing (84.7%) - Advice to increase consumption of soluble fiber (80.9%) | <p>Towards WMS:</p> <ul style="list-style-type: none"> - Pharmacists had a role to play in WMS (84.8%) - Providing information about diet products was the pharmacist's responsibility (83.1%) <p>Towards weight loss products:</p> <ul style="list-style-type: none"> - Companies marketing weight loss products made false promises (81.1%) - Weight loss products were not well-regulated (50%) | <ul style="list-style-type: none"> - Lack of private area (37.0%) - Lack of equipment (e.g., weighing scale, etc.) (39.8%) - Lack of staff (36.5%) - Lack of time (30.4%) - Lack of pharmacists' interest (18.6%) | <ul style="list-style-type: none"> - Multidisciplinary team approach (82.7%) - Media and advertisements (48.9%) - Additional payment (31.6%) - Knowledge to provide weight management services (21.5%) | |
| 3. Rohit Kumar Verma et al., 2019 ²⁴ | Malaysia | Cross-sectional survey | 550 (78.9%) | <ul style="list-style-type: none"> < 30-40 (76%), 41-70 (23.8%), > 70 (0.2%) | - | <p>Towards WMS:</p> <ul style="list-style-type: none"> - WMS was not part of pharmacists' responsibilities (7.6%) - Pharmacists did not wish to provide WMS (5.7%) | <ul style="list-style-type: none"> - Lack of staff (56.0%) - Lack of patient willingness to utilize weight management services in pharmacy (48.3%) - Increase in workload (45.7%) - Lack of private consultation room (36.4%) - Lack of equipment (28.6%) - Lack of pharmacists' time (28.3%) | <ul style="list-style-type: none"> - Extra payment (32.2%) | |



Table 1. Summary of study characteristics

| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators |
|---|-----------------|------------------------|-------------------------------------|---|--|---|----------|------------|
| 4. Yiran Rong et al, 2019 ³³ | United States | Cross-sectional survey | 426 (33.6%) | ≤ 49 (15.2%), 50-64 (44.1%), ≥ 65 (40.8%) | Weight management counselling: - OTC product recommendations to patients interested in weight management (30.4%) - pharmacists made 0-2 recommendations/ month for OTC weight loss agents (60.4%) | Towards WMS: - Felt comfortable in recruiting patients (42.9%) - Felt somewhat interested in starting WMS (35%) - Felt comfortable in counselling patients (68.6%) - Pharmacists in rural areas had less willingness to recruit patients - Pharmacists in chain pharmacies or staff pharmacists were less interested in implementing WMS. | - | - |



| Table 1. Summary of study characteristics | | | | | | | | |
|---|-----------------|------------------------|-------------------------------------|---------------|--|--|---|---|
| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators |
| 5. Abdelmoneim Awad et al, 2012 ⁴⁶ | Kuwait | Cross-sectional survey | 220 (93.6%) | | <p>Weight management counselling:</p> <ul style="list-style-type: none"> - Pharmacists counselled patients sometimes to most of the time (mean \pm SD = 3.67 ± 1.19). - Frequency of counselling was positively correlated with their perceived comfort with counselling ($r=0.80$; $p < 0.001$) and perceived effectiveness ($r=0.61$; $p < 0.001$). | <p>Towards WMS:</p> <ul style="list-style-type: none"> - Felt neutral to comfortable with counselling (mean \pm SD = 3.77 ± 1.19) - Providing WMS about diet and exercise and diet foods was effective most of the time (mean \pm SD = 4.47 ± 0.83, 4.11 ± 0.94) - Providing WMS with medications and anti-obesity products was effective sometimes (mean \pm SD = 3.37 ± 0.65, 3.23 ± 1.27). - WMS could minimize adverse effects from anti-obesity medications, improve patient adherence to anti-obesity medications (mean \pm SD = 3.46 ± 1.37, 3.43 ± 1.35). - WMS could improve eating a calorie-controlled diet, engaging in regular exercise, improving patient adherence to nutritional advice, and properly using nonprescription products and dietary supplements for weight loss (mean \pm SD = 3.75 ± 1.57, 3.73 ± 1.27, 3.68 ± 1.27, 3.59 ± 1.24) <p>Attitude towards effectiveness:</p> <ul style="list-style-type: none"> - WMS was somewhat effective (mean \pm SD = 3.80 ± 1.05) | <ul style="list-style-type: none"> - Lack of patient awareness about pharmacists' expertise in counselling (76.2%) - Pharmacists' opinions that obese patients lack willpower (71.8%) - Lack of time (69.4%) - Lack of staff (55.8%) - Lack of patient demand (53.4%) - Lack of private area (52.4%) - Lack of pharmacist interest (49.5%) - Lack of repayment (48.1%) - Patients' belief that obesity was controllable without medications (45.1%) - Patients' belief that obesity was not a disease (40.5%) - Lack of support from pharmacy management (mean \pm SD = 3.33 ± 0.96) | <ul style="list-style-type: none"> - Knowledge: Improvement of pharmacists' knowledge about obesity could motivate pharmacists to provide weight management services to a great extent (Mean \pm SD = 3.51 ± 0.72). - Communication skills: Improvement of pharmacists' communication skills could motivate pharmacists to provide WMS (mean \pm SD = 3.47) - Payment: Improvement in payment and compensation could motivate pharmacists to provide WMS (mean \pm SD = 3.06 ± 1.06). |



| Table 1. Summary of study characteristics | | | | | | | | | | |
|--|-----------------|------------------------|-------------------------------------|-----------------------|----------|--|---|---|--|--|
| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators | | |
| 6. Rumana S. Newlands et al., 2011 ³⁰ | Scotland UK | Cross-sectional survey | 83 (64.8%) | 27.7-44 (Median 31.5) | - | <p>Towards WMS:</p> <ul style="list-style-type: none"> - The service increased workload (92.8%) - There was a need for services, including WMS (67.5%) - Pharmacists needed to extend the service in their pharmacies (57.9%) - Providing services, including WMS, is not part of a pharmacist's job (25.3%) <p>Confidence levels</p> <ul style="list-style-type: none"> - 93.9% confident in measuring weight, height, BMI calculation - 84.3% confident in advice on healthy dieting - 79.5% confident in advice on physical activity - 78.3% confident in advice on weight loss drug - 75.9% confident in counselling skills - 62.7% confident in advice on weight loss product - 57.3% confident in one-to-one consultation - 32.5% confident in the estimation of body fat activity | <ul style="list-style-type: none"> - Lack of staff (59.7%) - Lack of private consultation area (40.8%) - Lack of equipment (42.2%) - Lack of knowledge (16.9%) - Lack of pharmacist interest (3.6%) - Lack of patient demand (30.1%) - Lack of patient awareness that pharmacy could provide services to achieve weight loss (54.2%) | <ul style="list-style-type: none"> - Additional payment (75.9%) - Training: 81.7%, 73.1%, 63.4%, and 60.5% of pharmacists in UK needed future training on an estimation of body fat, one-to-one consultation skills, weight-loss products, and advice on weight-loss drugs, respectively. | | |



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|---|-----------------|------------------------|-------------------------------------|-----------------------------|----------|---|---|--|--|
| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators | |
| 7. Abdelmoneim Awad et al, 2010 ⁴⁷ | Kuwait | Cross-sectional survey | 205 (92%) | 20-40 (79%), 41-60 (21%) | - | <p>Towards WMS:</p> <ul style="list-style-type: none"> - Pharmacists had responsibility for counselling health behaviours (97%) - I didn't have enough knowledge to provide WMS (21.5%) - Pharmacists indicated their willingness to participate in CPE (84%) | <ul style="list-style-type: none"> - Lack of pharmacists' time (58%) - Lack of patients' time (41%) - Lack of information and/or training (33%) - Lack of privacy or physical design of the pharmacy (26%) - Lack of patients' trust in the ability of pharmacists (11%) | <ul style="list-style-type: none"> - Study time: 76.0% indicated that more study time would facilitate enhanced pharmacy services, including WMS - Knowledge: Pharmacists agreed that the improvement of pharmacists' knowledge about obesity could motivate pharmacists to a great extent (Mean \pm SD = 3.51 \pm 0.72) - Communication skills could motivate pharmacists to provide WMS to some extent (mean \pm SD = 3.47 \pm 0.68). | |
| 8. Y. Wibowo, 2010 ³⁷ | Australia | Cross-sectional survey | 51 (49.5%) | N/A | - | <p>Towards WMS:</p> <p>Pharmacists did not feel WMS was part of their job (16.0%).</p> | <ul style="list-style-type: none"> - Lack of payment from insurance (62.0%) - Customers won't pay (56.0%) - Lack of confidence by pharmacy staff (42.0%) - Lack of opportunity to meet with local G.P.s or other health workers (40.0%) - General Practitioners (GPs) did not recognize pharmacists' skills in enhanced pharmacy services (38.0%) - Lack of appropriate knowledge/skills by pharmacists (36.0%) - Pharmacists thought that WMS would impair working relationships with local G.P.s (18.0%) | <ul style="list-style-type: none"> - Accreditation (81.6%) - Study time (76.0%) - Closed counselling area (70.0%) - Access to detailed patient notes (68.0%) - Appointment system (59.2%) - Clinical testing area (57.1%) | |



| Table 1. Summary of study characteristics | | | | | | | | | |
|---|-----------------|------------------------|-------------------------------------|--|--|--|---|--|--|
| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators | |
| 9. Sultan M Alshahrani et al, 2020 ⁴⁸ | Saudi Arabia | Cross-sectional survey | 191 (86.4%) | 20–30 years (38.74%), 31–50 years (60.2%), >50 years (1.04%) | - | Towards weight-loss products: - 64.91% of pharmacists would limit weight reduction agents to obese patients who could not reduce their weight through exercise and diet. Towards WMS: - 84.81% of pharmacists agreed that community pharmacists should advise patients to reduce weight | - | Knowledge and continuous education regarding weight reduction products | |
| 10. Mona Almanasef et al, 2021 ⁴⁹ | Saudi Arabia | Cross-sectional survey | 193 (64.3%) | 23-30 (64.2%), 31-40 (31.6%), > 40 (4.1%) | 61.7% of pharmacists reported to be "very involved" or "involved" in weight management service | Lack of patients' awareness of pharmacists' competencies (17.6%) | - Lack of access to patient information (27.8%) - Lack of multidisciplinary cooperation (20.2%) - Lack of time (23.9%) - Lack of space (18.1%) - Lack of standard guidelines for the service (17.6%) - Lack of knowledge or clinical skills (17.1%) - Lack of personnel or resources (14.0%) - Lack of reimbursement (14.0%) | - | |
| 11. Sumia Sir-Elkhatim Mohamed et al., 2013 ⁵² | UAE | Cross-sectional survey | 183 (67.0%) | 21–30 (73.4%), 31–60 (25.1%), ≥ 61 (1.6%) | - | - | - Lack of multidisciplinary cooperation (82.8%) - Lack of training (81.9%) - Lack of time (78.1%) - Lack of privacy (67.2%) - Lack of compensation (46.0%) | | |



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| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators |
|--|-----------------|-------------------------------------|-------------------------------------|---|----------|----------|--|---|
| 12. Pengyeow Loh et al, 2021 ⁴³ | Malaysia | cross-sectional observational study | 420 (18.9%) | 21-29 (19%), 30-39 (35.7%), 40-49 (28.1%), 50-59 (13.6%), ≥ 60 (3.6%) | - | - | -Lack of patients' time (63.6%) -Insufficient manpower (63.1%) -Lack of public awareness that such a service was available (54.7%) -Lack of training to provide the service (46.9%) -Lack of financial incentive (46.2%) -Increased operating cost (41.7%) -Lack of private space in the pharmacy (30.5%) -Lack of material resources such as computers, internet access, and pharmacy software (29.2%) -Lack of support from the employer (21.0%) | - |
| 13. Homa B Dastani et al, 2004 ⁴⁵ | U.S. | Survey | 139 (35.2%) | 49.5 ± 13 years | - | - | - | - Comfort level with counselling obese patients - Confidence in achieving positive outcomes - Perceived effectiveness of obesity management |

Mixed-method study



| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators |
|--|-----------------|--|-------------------------------------|---------------|---|--|--|---|
| 14. Sawсан AIMukdad et al, 2021 ⁵⁰ | Qatar | Mixed-method explanatory sequential design | Quantitative n = 270 (45%) | 34.38 ± 6.3 | <p>Problem identification and referral:</p> <ul style="list-style-type: none"> - 35.59% identified factors that may contribute to weight gain - 34.9% referred patients to other healthcare professionals - 21.9% evaluated patient readiness to change behaviour <p>Weight management counselling:</p> <ul style="list-style-type: none"> - 31.0% estimated the daily caloric requirements - 28.9% reviewed and designed a physical activity plan <p>Weight loss monitoring</p> <ul style="list-style-type: none"> - 19.0% reviewed and monitored patient's progress - 18.6% monitored patient adherence to nutritional and physical activity advice | <p>Towards WMS:</p> <ul style="list-style-type: none"> - Pharmacists agreed to strongly agreed that: <ul style="list-style-type: none"> - Pharmacists should offer nutritional advice (79%) - Pharmacists should offer P.A. advice (77.5%) - Pharmacists should be involved in setting optimal weight goals (76.8%) - Pharmacists should be involved in monitoring weight (76.4%) - Pharmacists also indicated their training needs, such as evidence-based pharmacotherapy of weight management, post-partum weight management, and counselling skills. | <ul style="list-style-type: none"> - Difficulty in follow-up (80.7%) - Lack of private area (75.7%) - Lack of time (75.2%) - Lack of patient awareness (72.7%) - Lack of reimbursement (72.4%) - Lack of management support (70.2%) - Patient opinions about obesity not as a disease (68.9%) - Patient's beliefs that obesity was controllable without medications (60.1%) - Lack of willingness among patients to lose weight (67.4%) - Lack of patient demand (62.1%) - Lack of pharmacist knowledge (55.2%) - Lack of pharmacist's interest in providing WMS (50.2%) | <ul style="list-style-type: none"> - Collaboration with other healthcare providers to help overweight and obese patients in losing weight (86.5%) - Use of social media and mobile applications to increase public awareness of the pharmacist's role in WMS and to improve pharmacist-patient interaction - Use of translation programs and pictograms in patients with language difficulty |
| Qualitative studies | | | | | | | | |
| 15. Rohit Kumar Verma et al., 2021 ⁴² | Malaysia | Interview | 24 | 20-59 | - | - | Lack of pharmacists' time, lack of staff, language barrier, lack of patients' awareness, lack of private area, the difficulty of follow up, lack of support from policymakers | Remuneration, accessibility, pharmacist-patient relationship, equipment and resources, patient information access, online application |
| 16. Muhammad Atif et al, 2020 ⁵¹ | Pakistan | Interview | 18 | 18-31 | - | - | Lack of staff, fear of causing patient offence, lack of patients' awareness, lack of private area | Remuneration, training, accessibility |
| 17. Aliki Peletidi et al, 2019 ²⁹ | UK | Interview | 15 | 18-69 | - | - | Lack of private area, lack of support from policymakers, lack of owner's interest | Remuneration, training, multidisciplinary cooperation |
| | | | | | - | - | Lack of pharmacists' time, fear of causing patient offence, the difficulty of follow up | Remuneration, advertising, equipment and resources |



| Author, year (ref. no.) | Country Setting | Study design | No. of participants (Response rate) | Age range (%) | Practice | Attitude | Barriers | Motivators |
|---|-----------------|--------------------------|-------------------------------------|---------------|--|--|--|---|
| 18. G.R. Donovan et al, 2016 ³⁴ | U.K. | Interview | 21 | > 40 | - | - | Lack of pharmacists' time, lack of staff, difficulty in discussing diet and exercise, lack of patients' awareness, lack of patients' demand, lack of private area | Multidisciplinary cooperation, pharmacist-patient relationship, culture in rural setting, equipment and resources |
| 19. Lesley Gray et al., 2016 ²⁵ | New Zealand | Interview | 11 | 23 to ≥60 | - | - | Lack of pharmacists' time, fear of causing patient offence, lack of pharmacists' confidence, lack of private area | Remuneration, multidisciplinary cooperation, equipment and resources |
| 20. Souhiela Fakh et al, 2016 ⁴⁰ | Australia | Nominal group discussion | 10 | 18-60 | - | - | Lack of pharmacists' time, lack of private area, the difficulty of follow up | Remuneration |
| 21. Irene S. Um et al, 2013 ³⁹ | Australia | Interview | 12 | N/A | - | - | Lack of pharmacists' time, lack of private area | Remuneration, cost-effective data |
| 22. Irene S. I. Um et al, 2010 ³⁸ | Australia | Interview | 20 | N/A | - | - | Lack of pharmacists' time, lack of staff, lack of private area, lack of patients' awareness, lack of patients' demand, lack of private area, lack of support from policymakers | Remuneration, training, multidisciplinary cooperation, accreditation, accessibility, advertising |
| 23. Anita Elaine Weidmann et al, 2015 ⁴¹ | U.K. | Interview | 31 | 29 to ≥60 | - | Towards WMS: -Positive views of providing services, e.g., measurement of weight, healthy eating advice | - | Training, accessibility, cost-effectiveness data, multidisciplinary cooperation |
| 24. Ali Qais Blebil et al, 2021 ⁴⁴ | Malaysia | Interview | 25 | 25 to ≥60 | Most pharmacists did not provide WMS but provided counselling on diet and exercise to reduce weight. | Towards WMS: - All pharmacists showed a positive attitude towards WMS | Expectations of fast-acting weight loss, insufficient knowledge | Multidisciplinary cooperation remuneration, training |

Note: WC = Waist circumference, PA = Physical activity, WMS = Weight management service, CPE = Continuing pharmacy education



people did not want to mention their weight, so pharmacists had difficulty motivating people to lose weight.²⁹ Pharmacy location significantly affected willingness to recruit patients for weight management services ($p = 0.04$). Pharmacists working in rural areas had less willingness to recruit patients for weight management services (mean \pm SD = 3.07 ± 1.011) than in urban (mean \pm SD = 3.36 ± 1.027) and suburban (mean \pm SD = 3.31 ± 1.088) areas.³³ Rural pharmacists may be overextended in trying to provide WMS in areas lacking other health resources.³³

Problem identification and referral

There are two steps in problem identification which are anthropometric measurement and identification of the cause of weight gain. Community pharmacies are considered the first contact point between patients and healthcare providers in healthcare systems. Community pharmacists were perceived as accessible and trustworthy healthcare professionals.³² This would offer an opportunity for pharmacists to identify their weight-related problems. In addition, patients will be more comfortable talking about sensitive issues like weight with community pharmacists and cooperating in the anthropometric measurement. Anthropometric measurement included weight measurement, height measurement, body mass index (BMI) calculation, waist circumference measurement, and body fat measurement. BMI calculation, waist circumference measurement, and body fat measurement should be provided in addition to weight and height measurements to make the diagnosis of obesity become more accurate.³² However, few pharmacists performed BMI calculation (10.2% in Qatar⁵⁰ and 39.8% in Lebanon³²), waist circumference measurement (5.6% in Qatar⁵⁰ and 10.8% in Lebanon³²), and body fat measurement (5.6% in Qatar⁵⁰ and 15.5% Lebanon³²). A study in U.K.³⁰ also showed that only 32.5% of pharmacists were confident in body fat measurement. Around one-third (30.3%) of the pharmacists in Qatar⁵⁰ reported not being competent in estimating patients' body fat measurement. After anthropometric measurement, pharmacists identified potential causes of weight gain, including patient factors and medications. A study in Qatar⁵⁰ showed that almost one-third (28.9%) of pharmacists never or rarely identified patient or medicine-related factors contributing to weight gain. According to the weight management guidelines,⁵⁵ patients with a BMI above 27 kg/m² with comorbidity or above 30 kg/m² needed pharmacological treatment or surgery. In Qatar,⁵⁰ 34.9% of pharmacists always and often referred overweight and obese patients to other healthcare professionals and specialist services.

Weight management counselling and intervention

The assessments of the patient's readiness to change, perceived importance of change, confidence to change, and perceived barriers for ambivalence and motivation to change were important initial steps before lifestyle modification.⁵⁶ Then pharmacists provided diet and physical activity counselling for lifestyle modification. Pharmacists provided several activities related to diet and physical activity counselling. More than half of pharmacists (61.7%) in Saudi Arabia⁴⁹ were involved in weight management services, 88.6% of pharmacists in Malaysia³¹ provided nutritional advice upon customer

request, and 86.3% of pharmacists in Lebanon³² provided diet counselling. In contrast, only 31.0% and 28.9% of pharmacists in Qatar⁵⁰ provided counselling on diet and physical activity plans. Pharmacists offered diet advice with and without the promotion or selling of weight-loss products.^{31,32,50} Moreover, some pharmacists provided diet counselling based on diseases such as diabetes, hypertension, and gout. A study showed that weight management with diet and lifestyle modification advice by pharmacists could help patients with type-2 diabetes to reduce weight significantly when compared to standard practice.⁵⁷ An important skill for diet counselling included the estimation of caloric intake to make WMS effective. Most pharmacists (86.3%) in Lebanon³² often or always counselled their patients on a diet and advised the patients to increase their consumption of soluble fiber (80.9%), but only 31.0% of pharmacists in Qatar⁵⁰ estimated the daily caloric requirements for overweight and obese patients. Physical activities were critical for weight reduction. Pharmacists in several countries^{32,37,46,50} performed physical activity advice. There are three steps in physical activity counselling which are reviewing the patient physical activity, designing a physical activity plan, and monitoring patient adherence to the advice.^{32,50} About seventy-seven per cent (77.5%) of pharmacists in Qatar⁵⁰ agreed to strongly agreed that pharmacists should offer physical activity recommendations to help overweight and obese patients. However, only 34.4% of pharmacists were fully competent in reviewing patient physical activity and designing a physical activity plan, and 36.8% were fully competent in monitoring patient adherence to the advice. Few studies showed that pharmacists dominantly dispensed products for weight reduction. A study in Lebanon³² showed that 84.7% of pharmacists reported selling weight loss products, such as herbs, green tea, and laxatives, at the pharmacy. About 50% of pharmacists in UK⁵⁸ reported that customers could misuse the products. Therefore, in addition to selling weight loss products, 86.3% of pharmacists also counselled customers about the safe and effective use of the products, and 73.6% of pharmacists always or often asked about any side effects from weight loss products. In addition to correcting misunderstandings and discussing side effects, pharmacists also had a role in improving adherence to weight-loss medications with a prescription, such as orlistat (Figure 2).⁵⁸

Monitoring and follow up

Monitoring and follow-up of weight management plans would improve the success of pharmacists' weight management interventions. Since patients had easy access to pharmacy, having pharmacist-patient contact in community pharmacies could enhance opportunities to follow up and monitoring³⁸ and augment patients' adherence to the weight management plan. For patients who could not come to the pharmacy, pharmacists followed up by calling and texting patients. Pharmacists kept records of differences in weight, body mass index, and percentage of weight loss. In addition, a nutrition and exercise history questionnaire has also been used to monitor weight loss progress. For patients who failed to achieve a goal, pharmacists would help in modifying goals, reinforcing patients, and problem-solving.⁵⁹ Few pharmacists



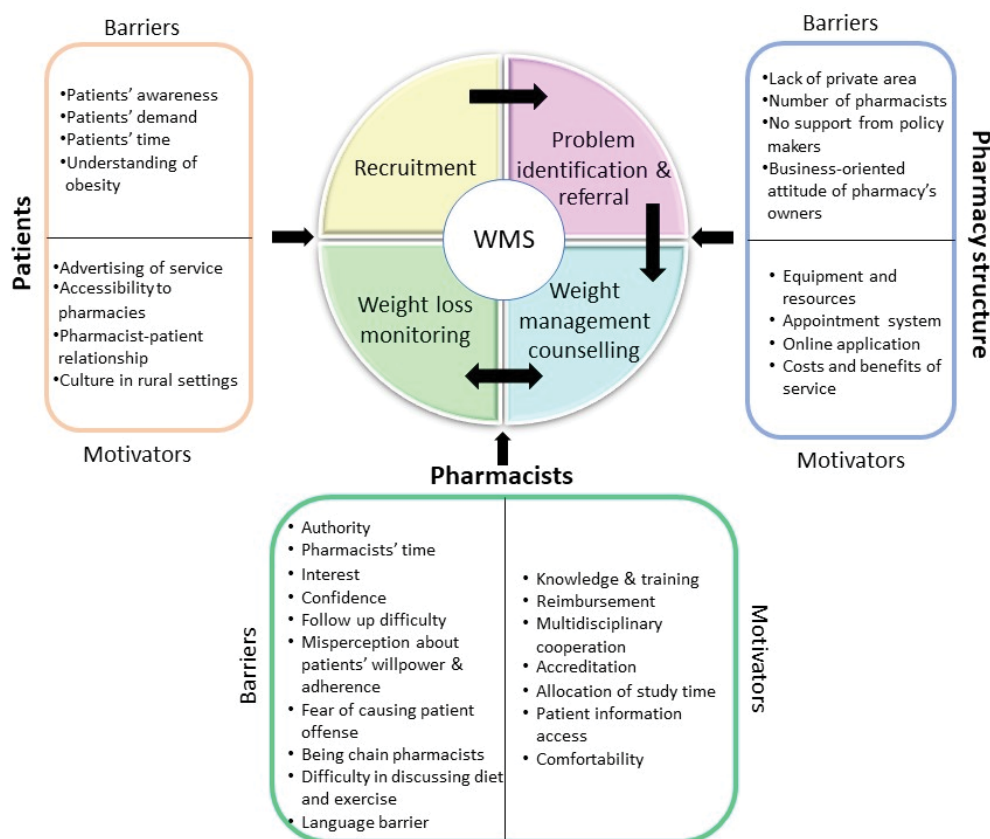


Figure 2. Conceptual framework for weight management service provided by community pharmacists

in Qatar⁵⁰ reported monitoring patient's progress (19.0%) and adherence to nutritional and physical activity advice (18.6%). Most pharmacists (80.%)⁵⁰ agreed that it was difficult to follow up. Mobile applications and social media platforms such as WhatsApp®, Facebook®, and Twitter® were recommended to facilitate weight management monitoring and increase public awareness of WMS by pharmacists.⁵⁰ The extent of problem identification, referral, counselling, and monitoring are shown in Figure 3.

Pharmacists' attitude toward weight management service

Pharmacists' attitudes related to weight management in all included studies can be classified into two major perspectives, which were attitudes toward weight loss products and weight management services.

Attitude towards weight loss products: A survey in the U.S. showed that 32.7% of community pharmacists have never recommended over-the-counter (OTC) weight loss agents.³³ Only 9.2% of pharmacists provided more than 10 recommendations per month. Similarly, pharmacists in Lebanon³² did not prefer selling weight loss products. They viewed that the companies made a false promise of weight loss products in their marketing (81.1%), the products were not well regulated (50%), and certain weight-loss drugs could cause significant adverse effects. Pharmacists would only provide weight reduction agents to obese patients who could

not reduce their weight through exercise and diet.⁴⁸

Attitude towards weight management services: The majority of community pharmacists in Kuwait (97%),⁴⁷ Lebanon (83.1%),³² Qatar (79%),⁵⁰ and Egypt (69.3%),³¹ Saudi Arabia,⁴⁸ U.K.,⁴¹ and Malaysia⁴⁴ had a positive attitude towards health behaviour and diet counselling for weight management and thought that it should be a part of community pharmacists' responsibilities. Pharmacists were more likely to prefer a patient-centred weight management approach rather than a product-centered weight management approach.⁶⁰ Pharmacists also perceived that diet foods and exercise were more effective than weight-loss medications and products.⁴⁶ Pharmacists in Egypt³¹ believed that therapeutic nutrition was more important than medications in some conditions (22.8%). They also believed that a combination of nutritional and pharmacological therapies should be offered for weight management in most patients (27.7%). Pharmacists felt confident that weight management services could improve patients' calorie-controlled diet eating, patients' regular exercise, adherence to nutritional advice, and proper use of weight loss products.⁴⁶

Weight management practice barriers

All barriers in the included studies can be classified into three aspects which are factors related to 1) pharmacists, 2) patients, and 3) pharmacy structure. Pharmacists' authority affected the provision of weight management services. Pharmacists

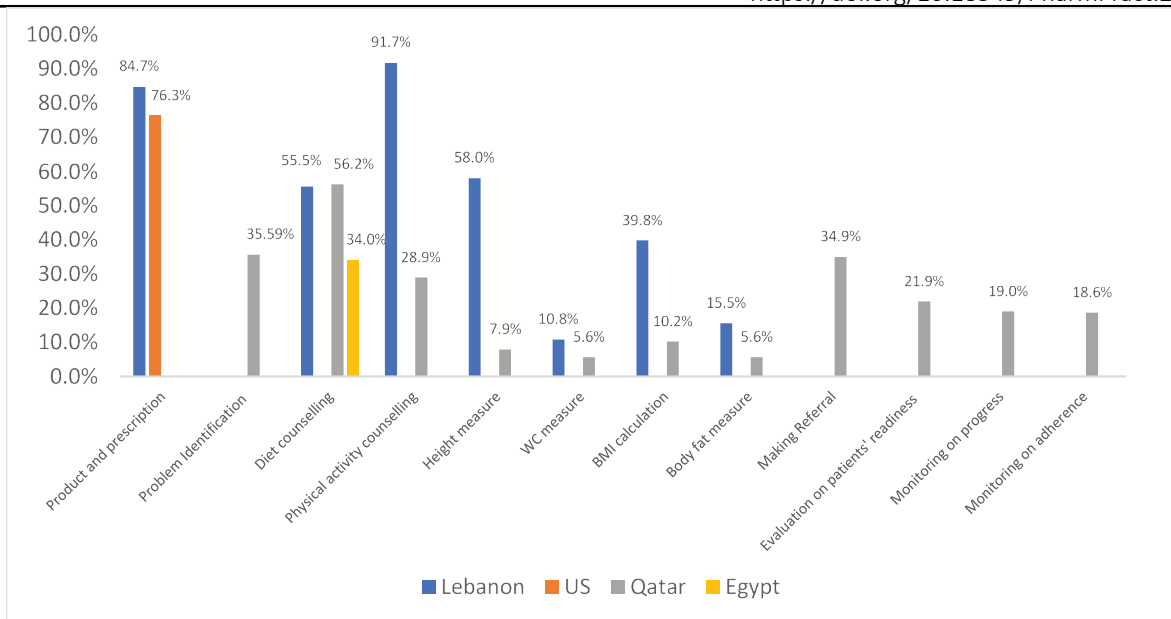


Figure 3. Weight management service provision among countries

working in chain pharmacies or as staff pharmacists had a significantly lower interest in starting weight management services than pharmacists in independent pharmacies.³³ The most reported barrier to weight management related to pharmacists was pharmacists' time.^{30,32,37,46,50,51,61} Lack of confidence was reported as a barrier to weight management services in many studies.^{25,37} Pharmacists' confidence was also significantly and positively associated with the frequency of counselling about obesity management ($r = 0.39$; $p < 0.001$).⁴⁵ Lack of patients' awareness of pharmacists' role and ability in weight management^{31,38,42,46,50,54,61} was the highest-mentioned barrier related to patients, followed by a lack of patients' demand.^{24,38,46,50,54} Therefore, it is crucial to generate community perceptions that pharmacists are another source of weight management advice or maybe the first source of obesity counselling. Social media was suggested to raise awareness about the role of pharmacists and induce demand by pointing out complications of obesity.^{24,46} Patients tended to require fast-acting weight-loss products rather than lifestyle modification.⁴⁴ Therefore, patients' expectation of fast weight loss results was a barrier to advise on lifestyle modification. Lack of a private area^{25,30-32,46,50,51,61} was most mentioned as the pharmacy structure barrier to weight management, followed by the inadequate number of pharmacists^{24,30,32,37} Follow-up difficulties^{29,40,50} was also mentioned as a barrier to weight management in the pharmacy. To cope with the difficulty of following up on patients' progress and adherence to the weight management program, pharmacists recommended a documentation system for all pharmacies to know patients' history and allow monitoring, and also using an online account or application to facilitate patients' contact with the pharmacist.⁵⁰ Lack of standard guidelines for pharmacy service, including weight management, was another barrier.⁴⁹

Weight management practice motivators

Pharmacists' knowledge and training in weight management were mentioned most as a motivator.^{31-33,37,38,41,42,46,47,50,51} Most

pharmacists in Egypt (95.4%),³¹ U.K. (81.7%),³⁰ UAE (81.9%),⁵² Malaysia (46.9%),⁴³ and Kuwait (33%)⁴⁷ perceived training as a significant motivator. This study revealed that pharmacists needed two dimensions of knowledge for weight management which were 1) knowledge related to diet, lifestyle modification, and products for weight reduction and 2) knowledge related to enhancing patient engagement in weight management programs. The majority of pharmacists required knowledge to help reduce patient's weight, such as medical nutrition therapy (95.4%),³¹ estimation of body fat (81.7%),³⁰ weight-loss products (63.4%),³⁰ evidence-based pharmacotherapy in nutrition,⁵⁰ post-partum weight management,⁵⁰ estimation of caloric intake,³¹ documentation,³¹ and weight management outcome monitoring and patient adherence monitoring.³¹ Pharmacists also needed skilled training to augment patient engagement in their weight management, such as motivational counseling, communication skills, and one-to-one consultation skills (73.1%).³⁰ In addition, the need for training for raising public awareness about pharmacists' abilities to provide nutrition counseling (69.8%)³¹ and to implement a weight management program (48.9%)³³ was also mentioned. Pharmacy education was less likely to provide education about weight management. Only 21.7% and 14.8% of U.K. pharmacists at undergraduate and postgraduate levels, respectively, received training in weight management.³⁰ Few pharmacists in Saudi Arabia (17.6%)⁴⁹ thought that absence of standard guidelines for the service was a barrier. Therefore, community pharmacists were ready to provide service. The majority of pharmacists in Australia indicated that accreditation (81.6%)^{37,38} and allocation of study time (76.0%)³⁷ would facilitate the practice. Reimbursement and compensation could motivate pharmacists to provide weight management services.^{22,25,29,30,32,37-40,42,44,50,51} Multidisciplinary collaboration also motivated pharmacists to provide weight management services.^{29,38,41,44,51,54} Pharmacists could obtain some advice from dietitians, nutritionists, and



exercise trainers. Many pharmacists expressed a willingness to refer patients to other professionals if they had expert contact, and they also indicated that patient information access (68.0%)^{37,41,50} would facilitate the service. Pharmacists' comfortability level was also a motivator in counselling obese patients^{33,46} and recruiting patients for weight management.³³ There were significant relationships between the frequency of counselling about obesity and pharmacists' comfortability level ($r = 0.47$; $p < 0.001$).⁴⁵ From the patient aspect, advertising weight management services^{29,32,38} raised patient awareness of this service's availability in the pharmacy. Patient's accessibility to pharmacies^{38,42,50} and pharmacist-patient relationship^{33,50,54} enhanced patient engagement and patients' follow-up and loyalty to weight management services. The evidence showed that people in rural areas^{33,54} tended to spend more time talking with pharmacists than in urban areas. This implied that patients' time increased the opportunity to discuss weight management. In the pharmacy structure aspect, equipment, and resources, such as weighing scales, flyers, and educational materials, would support weight management services.^{25,29,31,32,54} Using an appointment system³⁷ and online application⁵⁰ increased the ease of patient contact and then motivated pharmacists to provide the service. The cost and benefit of the services³⁹ for their business would motivate pharmacists to provide weight management in their pharmacies.

DISCUSSION

Our systematic review established crucial points to make pharmacists achieve success in weight management services. Firstly, to recruit patients for weight management, there was a need for communication training allowing pharmacists to initiate a conversation with patients in a politically correct style to avoid offending patients. Secondly, motivational counselling (MC) was also required.^{62,63} In MC, pharmacists guided patients to perceive the benefits of changing lifestyles and assess their self-image with and without obesity. Pharmacists convinced patients to believe they could change and commit to acting on this belief. Thirdly, cognitive behaviour therapy (CBT) was applied to maintain behavioural change and prevent relapse.^{63,64} Processes of change from the transtheoretical model, such as counterconditioning, helping-relationship, reinforcement management, and stimulus control, were recommended. Pharmacists suggested substituting alternative problematic behaviours, such as a low-calorie diet, low-calorie snacks, and positive self-statements, and establishing behaviour in favour of making positive changes. Pharmacists must build patient relationships in ways that make patients become open so that they trust pharmacists as social support. Our systematic review found that rural pharmacists were less likely to provide weight management. This might be because they have more personal connections with their patient community and would like to avoid a sensitive issue about weight. Pharmacists should assist patients by providing emotional support and suggest patients establish a social environment where significant persons can encourage patients. CBT involves patients' agreement to change eating and physical activity habits. Six modules in CBT were recommended.⁶⁴ They were 1) food intake, physical

activity, body weight monitoring, 2) eating behaviours changing, 3) exercise planning, 4) weight-loss obstacle discussing, 5) weight-loss dissatisfaction solving, and 6) weight-maintenance obstacle conquering. CBT provided better personalization of the intervention and better behavioural change for long-term weight control. Removing stimuli for an unhealthy life, such as getting rid of unhealthy foods from their refrigerator and substituting them with a healthy alternative, such as making shopping lists to buy healthy foods in advance, was a must to advise patients. A rewarding system was also recommended to maintain patients' behavioural changes for weight loss. The combination of MC and CBT in weight management led to significant improvements in weight reduction.^{63,64} These skills should be included in the pharmacy curriculum. It will be beneficial for students to have some experience in weight control themselves to understand the challenges faced by patients.⁶⁵ Three areas for training were explored in various studies. They included diet, physical activity, and behaviour change.^{39,53,65-70} Lastly, several skills, such as precise waist circumference measurement and the interpretation of body fat mass, are required. Identifying causes of weight gain and referring patients to other healthcare professionals is also critical knowledge for weight management. These skills are recommended in continuing pharmacy education (CPE) because accreditation is a primary motivator for pharmacists to provide WMS. Small group lectures with workshops and online training were preferred over large class lectures.⁶⁷ Not only availability of training, but pharmacies should also schedule an appropriate time for pharmacists to study to enhance pharmacy service in weight management. After completing the training, pharmacists will gain more comfort and confidence in practising weight management services. The workshop helped diminish the fear of causing patient offence and enhanced pharmacists' interest in implementing the service at pharmacies. Moreover, reimbursement was another booster to motivate pharmacists to provide this service. Building a healthy relationship between the pharmacist and patient would improve trust and reduce problems of misperception about patients' willpower and adherence to the service, as well as decrease difficulty in discussing diet and exercise and follow-up. The face-to-face conversation was crucial to build a pharmacist-patient relationship through physical and verbal contact.⁷¹ Pharmacists also had to communicate with open-minded gestures to gain patients' trust. Providing all information to enable patients to make their own decision would bring about more trust and cooperation in weight loss services. Lack of patient information access and multidisciplinary cooperation may hinder pharmacists from practising weight management services. With multidisciplinary cooperation, pharmacists could discuss weight management plans with other healthcare professionals, such as doctors, nurses, dietitians, and trainers, to make plans more efficient for each patient. Increasing public awareness of weight management in pharmacies could attract patients to WMS. Our systematic review found patient accessibility and time were influential to the W.M. services. In this technological era, online and telecommunication were critical tools to cope with these issues. One significant barrier to WM service in pharmacies was pharmacy owners.



Financial profits were essential from the owners' perspective, so pharmacy-related organizations should help to reimburse and motivate pharmacy owners and pharmacists to offer W.M. services. Even though it appears people in rural areas can spend more time talking with pharmacists, pharmacists in rural areas were less likely to provide WMS than in suburban and urban areas.³³ This might be because pharmacists felt overextended in providing services to patients in areas lacking other health resources. The current systematic reviews also found additional pharmacists, educational materials, expert advice, and referral pathways would motivate pharmacists to provide W.M. services. Furthermore, equipment, resources, and a convenient appointment system could also make

pharmacists more available and make the program more attractive to patients.

Limitations and recommendations

Our systematic review provided a comprehensive conceptual framework for factors affecting weight management services by pharmacists. This conceptual framework can guide future research and assist policymakers' decision-making. However, there were some limitations existing like other research. There might be some studies published not in the English language about community pharmacists' weight management services which were not included in the current systematic review, and this review did not include unpublished literature.

References

1. Tongrod W. GPP Phase 1: Good Pharmacy Practice Phase 1 in Thailand (Mobile CPE), 2018. Available at: <https://ccpe.pharmacycouncil.org>. Accessed November 12, 2021.
2. World Health Organization. Good pharmacy practice: Joint FIP/WHO guidelines on good pharmacy practice 2011. Netherlands: World Health Organization. 2021.
3. Samor N. The Influence of Good Pharmacy Practice and Service Quality Effecting the Satisfaction of Citizens in Mueang Chiang Rai District Chiang Rai Province. (Master of Business Administration). Ramkhamhaeng University. 2018.
4. Food and Drug Administration. Ministerial regulations for permission and issuance of modern drug Sales License.2013. Available at <https://www.fda.moph.go.th/sites/drug/SitePages/Law02-Ministerial-regulations.aspx> Accessed November 12, 2021.
5. Nakhon Ratchasima Provincial Public Health Office. Report of drug store licenses 2020.
6. Ajzen I. Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology*. 2002;32(4):665-683. <https://doi.org/10.1111/j.1559-1816.2002.tb00236.x>
7. Public Health Ministerial Declaration in 2013 on Determine the duration of the licensee to sell modern drugs and who has the duty to perform must follow the Public Health Ministerial Rule in 2013 on license application and licensing of modern drug selling. Royal Gazette No.134, Part 215D (Aug 31, 2017).
8. Public Health Ministerial Declaration in 2014 on the requirement of premises instruments and good pharmacy practice in selling establishments of modern drugs according to the Drug Act. Royal Gazette No.131, Part 223D (Nov 5, 2014).
9. Leauwong S. Driving the Policy for Improving the Standard of Drugstores in Udon Thani Province. *Thai Journal of Pharmacy Practice*. 2018;10(1):37-48.
10. Weraphasook W. Kanchanaburi Pharmacy Development for Good Pharmacy Practice (GPP) Accomplishment. *FDA Journal*. 2015;22(3):27-44.
11. Selvaraj A, Redzuan AM, Hatah E. Community pharmacists' perceptions, attitudes and barriers towards pharmacist-led minor ailment services in Malaysia. *International journal of clinical pharmacy* 2020;42(2):777-85. <https://doi.org/10.1007/s11096-020-00973-x>
12. Hanafi S, Poormalek F, Torkamandi H, et al. Evaluation of community pharmacists' knowledge, attitude and practice towards good pharmacy practice in Iran. *Journal of Pharmaceutical Care*. 2013;1(1):19-24.
13. Sombutpoothon P. Factors on drug store with good pharmacy practice to abide the criterion of the quality pharmacy at Chonburi province. (Master of Pharmacy (M.Pharm.)). Naresuan University. 2021.
14. Hasitpanichkula N, Jadesadalug V. The impacts of the Pharmacy Accreditation development according to the Pharmacy Council standards towards customer response, competitiveness, and performance of pharmacies in Nakhon Pathom. *Journal of Community Development Research (Humanities and Social Sciences)*. 2014;7(1):1-20.
15. Chariyasirisuk S, Saokaew S. Inspection of Good Pharmacy Practice among Modern Drugstores in Kamphaengphet. *Thai Journal of Pharmacy Practice*. 2020;12(1):92-102.
16. Badro DA, Sacre H, Hallit S, et al. Good pharmacy practice assessment among community pharmacies in Lebanon. *Pharm Pract (Granada)*. 2020;18(1):1745. <https://doi.org/10.18549/PharmPract.2020.1.1745>
17. Chuntaravichit U. Development Model to Upgrade Good Pharmacy Practice (GPP) Standards in Drugstore, Singburi. *Public Health Office*. 2020;29(1):119-128.
18. Thavornwattanayong W, Yuklanthuan C, Panyakrua P, et al. Pharmacy owners'opinions in Nakhon Pathom province on the notification of the Ministry of Public health B.E. 2557 (2014) on the regulations of setting, equipment and Good Pharmacy Practice. *Thai Bull Pharm Sci*. 2016;11(2):27-44.
19. Onprasert P, Sutheravut P. Development Approach for Pharmacy to Reach Standards of Quality Pharmacy: Yala Province. *Al-Hikmah Journal*. 2016;11(6):67-77.



APPENDIX

Questions of QualSys[®] Tool for quantitative studies (yes = 2, partial = 1, no = 0)

| No. | Question | Note |
|-----|--|------|
| Q1 | Question/Objective sufficiently described? | |
| Q2 | Study design evident and appropriate? | |
| Q3 | Method of subject/comparison group selection or source of information / input variables described and appropriate? | |
| Q4 | Subject (and comparison group, if applicable) characteristics sufficiently described? | |
| Q5 | Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/ misclassification bias? | |
| Q6 | Sample size appropriate? | |
| Q7 | If interventional and random allocation was possible, was it described? | |
| Q8 | If interventional and blinding of investigators was possible, was it reported? | |
| Q9 | If interventional and blinding of subjects was possible, was it reported? | |
| Q10 | Analytic methods described/ justified for the main results? | |
| Q11 | Some estimate of variance is reported for the main results? | |
| Q12 | Results reported in sufficient detail? | |
| Q13 | Conclusion supported by the results? | |
| Q14 | Controlled for confounding? | |

Appendix A. Quality assessment scoring for quantitative studies

| Author, year, study, study place (ref. no.) | Average score given by three researchers for each question of the tool used in the current systematic review | | | | | | | | | | | | | | Total average |
|---|--|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|---------------|
| | Q 1 | Q 2 | Q 3 | Q 4 | Q 5 | Q 6 | Q 7 | Q 8 | Q 9 | Q 10 | Q 11 | Q 12 | Q 13 | Q 14 | |
| 1. M. Medhat et al., 2020, Egypt ³¹ | 1 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 0 | 2 | 2 | N/A | 0.85 |
| 2. Mohamad Ali Hijazi et al, 2020, Lebanon ³² | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | N/A | 1.0 |
| 3. Rohit Kumar Verma et al., 2019, Malaysia ²⁴ | 2 | 2 | 1 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | N/A | 0.95 |
| 4. Yiran Rong et al., 2019, United States ³³ | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 1 | 1 | N/A | 0.9 |
| 5. Abdelmoneim Awad et al., 2012, Kuwait ⁴⁶ | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | N/A | 1.0 |
| 6. Rumana S. Newlands et al., 2011, Scotland, UK ³⁰ | 2 | 2 | 2 | 2 | 2 | 1 | N/A | N/A | N/A | 2 | 1 | 1 | 1 | N/A | 0.8 |
| 7. Abdelmoneim Awad et al., 2010, Kuwait ⁴⁷ | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | N/A | 1.0 |
| 8. Y. Wibowo, 2010, Australia ³⁷ | 2 | 1 | 1 | 2 | 2 | 1 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | 2 | 0.86 |
| 9. Sultan M Alshahrani et al., 2020, Saudi Arabia ⁴⁸ | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | N/A | 1.0 |
| 10. Mona Almanasef et al, 2021, Saudi Arabia ⁴⁹ | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 1 | N/A | 0.95 |
| 11. Sumia Sir-Elkhatim Mohamed et al., 2013, UAE ⁵² | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | N/A | 1.0 |
| 12. Pengyeow Loh et al, 2021, Malaysia ⁴³ | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 2 | 2 | N/A | 1.0 |
| 13. Homa B Dastani et al, 2004, US ⁴⁵ | 2 | 2 | 2 | 2 | 2 | 2 | N/A | N/A | N/A | 2 | 2 | 1 | 2 | N/A | 0.95 |

Note: N/A = not applicable to the study

Questions of QualSys[®] Tool for qualitative studies (yes = 2, partial = 1, no = 0)



| No. | Question | Note |
|-----|--|------|
| Q1 | Question/Objective sufficiently described? | |
| Q2 | Study design evident and appropriate? | |
| Q3 | Context for the study clear? | |
| Q4 | Connection to a theoretical framework / wider body of knowledge? | |
| Q5 | Sampling strategy described, relevant and justified? | |
| Q6 | Data collection methods clearly described and systematic? | |
| Q7 | Data analysis clearly described and systematic? | |
| Q8 | Use of verification procedure(s) to establish credibility? | |
| Q9 | Conclusions supported by the results? | |
| Q10 | Reflexivity of the account? | |

| Appendix B. Quality assessment scoring for qualitative studies | | | | | | | | | | | | |
|--|--|-----|-----|-----|-----|-----|-----|-----|-----|------|---------------|--|
| Author, year, study, study place (ref. no.) | Average score given by three researchers for each question of the tool used in the current systematic review | | | | | | | | | | Total average | |
| | Q 1 | Q 2 | Q 3 | Q 4 | Q 5 | Q 6 | Q 7 | Q 8 | Q 9 | Q 10 | | |
| 14. Sawsan AlMukdad et al, 2021 (mixed-method), Qatar ⁵⁰ (mixed-method) | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 0.9 | |
| 15. Rohit Kumar Verma et al., 2021, Malaysia ⁴² | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.0 | |
| 16. Muhammad Atif et al, 2020, Pakistan ⁵¹ | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 0.95 | |
| 17. Alike Peletidi et al, 2019, England, UK ²⁹ | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.0 | |
| 18. G.R. Donovan et al., 2016, England, UK ⁵⁴ | 2 | 2 | 2 | 2 | 0 | 2 | 2 | 0 | 2 | 2 | 0.8 | |
| 19. Lesley Gray et al., 2016, New Zealand ²⁵ | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 0 | 2 | 2 | 0.85 | |
| 20. Souhiela Fakhri et al, 2016, Australia ⁴⁰ | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 2 | 0.9 | |
| 21. Irene S. Um et al, 2013, Australia ³⁹ | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.0 | |
| 22. Irene S. I. Um et al, 2010, Australia ³⁸ | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 0 | 2 | 2 | 0.85 | |
| 23. Anita Elaine Weidmann et al, 2015, UK ⁴¹ | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 0 | 2 | 2 | 0.9 | |
| 24. Ali Qais Blebil et al, 2021, Malaysia ⁴⁴ | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1.0 | |