

Table 2: Characteristics of included studies

No.	Author (Year), City, State, Country	Study Population	Sample Size (n), M Age ($\pm$ SD), Female (%)	Study Design	Intervention and framework used	Comparative	Intervention duration and data collection tools	Outcome and findings
1	Singh (2024) (17), Durban, KwaZulu-Natal, South Africa	Prediabetic/prehypertensive employees from 2 multinational companies (Unilever and Retail) across eight worksites	n=147 (72 canteen and behavior (CB) intervention, 75 canteen only), 41.6 (9.8) years, 55%	Two-arm randomized controlled trial	CB: Modifications to the worksite canteen using the TIPPME framework (e.g., added healthy options like brown rice, free water, seed sprinkles; portion control; promotional materials). Lifestyle Programme: A 6-week, intensive program based on the Diabetes Prevention Programme (DPP), including weekly education sessions on diet and exercise, physical activity classes, and self-monitoring with food diaries.	Canteen-Only (CO). Intervention focused on modifying the worksite food environment. No behavioural/lifestyle classes	6-week intervention, HbA1c, systolic and diastolic, Lipid profile, Anthropometry, 24-hour dietary recall, dietary Quality Questionnaire, Global Physical Activity Questionnaire, Framingham Risk Score	Primary: Change in a composite score of cardiometabolic risk factors (success defined SBP $\downarrow \geq 5$ mmHg, Triglycerides $\downarrow \geq 0.1$ mmol/L, HbA1c $\downarrow \geq 0.5\%$) CB: Improved 1 risk factor: 38 (25.8%), Improved 2 risk factors: 13 (8.8%), Improved all 3: 0 Secondary: Changes were small and inconsistent across arms. No clear superiority of CB over CO for short-term anthropometric change. Some awareness may have improved choices, but dietary patterns remained limited. Worksite PA promotion showed feasibility, but short-term impact was limited. No large short-term reductions in projected CVD risk.

								CO achieved similar outcomes to CB with lower resource demand.
2	Akksilp et al. (2022) (31), Bangkok, Thailand	Office workers under Thailand's Ministry of Public Health	n=282 (Control:142, nine offices, Intervention: 140, nine offices), 38.6 (10.4), 81%	Cluster randomized controlled trial	Multicomponent physical activity at Work (PAW): 1) Individual (Fitbit + incentives), 2) Social (group movement breaks), 3) Environmental (posters), 4) Organizational (leader support), Social-Ecological Model	Control group (no intervention)	6-months, ActiGraph TM accelerometers, Global Physical Activity Questionnaire, physical examination, and blood collection for biomarker	Primary: Not significantly reduce sedentary time compared with the control group, either during work hours or across the whole day. Secondary: Did not significantly increase PA (light PA, MVPA, or steps), although small, non-significant positive trends were observed for MVPA and steps during waking hours. No statistically significant between-group differences were found for, BMI, Waist-to-hip ratio, systolic Blood pressure, Pulse, Total cholesterol, Triglycerides, HDL cholesterol, LDL cholesterol, Fasting blood glucose, HbA1c, Uric acid, C-reactive protein. Tertiary: No significant difference between groups for work productivity, neck pain & lower back pain.
3	Kong et al. (2017) (22),	Employees at Sarawak Government	n=70 intervention, 73 control),	Single-center, Randomi	Dietary: Individualized low-calorie diet (500 kcal deficit) and	Received "traditiona	12 weeks, physical measurements, biochemical	Primary: Waist circumference: Intervention group had a

	Bintulu, Sarawak, Malaysia	Polyclinic with BMI at least $\geq 18.5 \text{ kg/m}^2$	34.3 (8.9), 72%	zed controlled trial	counseling from a Registered Dietitian (RD). Physical Activity: Supervised High-Intensity Interval Training- Zumba dance classes (3 days/week, 45-60 mins). Behavioral: Motivational Interviewing sessions with the RD.	counseling " including pre-printed dietary materials from a Medical Officer and supervised aerobic exercise (e.g., treadmill, cycling) 3 days/week .	measurements, 24-hour dietary recall	reduction than control ($-6.9 \pm 0.9 \text{ cm}$, $P < 0.01$), Hip circumference ($-6.5 \pm 1.1 \text{ cm}$, $P < 0.01$), BMI ($-0.80 \pm 0.3 \text{ kg/m}^2$, $P < 0.01$). Secondary: Systolic blood pressure (BP): Reduction in intervention group compared to control ($-5.1 \pm 2.0 \text{ mmHg}$, $P < 0.05$), Diastolic BP ($3.4 \pm 2.1 \text{ mmHg}$, $P = 0.11$), Total cholesterol (TC), LDL-C, TG, FBS, 2-hr OGTT, HbA1c: Intervention group showed significant reductions, HDL-C: ($0.25 \pm 0.6 \text{ mmol/L}$, $P < 0.01$). Intervention group had significant improvements in energy intake ($-553 \pm 339 \text{ kcal}$), protein, fat, carbohydrates, and dietary fiber intake (all $P < 0.01$).
4	Roszanadia Rusali et al. (2016) (24), East Coast, Malaysia	Employees with $> 24.9 \text{ kg/m}^2$ of a petroleum refinery	n=64 (32 intervention, 32 control), ~40 years, 50%	Quasi-experimental	Education: Monthly group sessions on diet and exercise by dietitians and physiotherapists. Behavioral: Interactive activities (supermarket tour, calorie estimation games), a motivational	Received routine individual weight management consultations from a dietitian	3 months, Anthropometric and biochemical measurements, self-reported questionnaire on diet related knowledge, attitude and practice.	Primary: Men: Waist circumference reduced by 3.4% (-3.7 cm), $p < 0.05$ (effect size=0.205) Women: BMI reduction by 1.4% (-0.4 kg/m^2) $p < 0.05$ Secondary: Men: No significant changes in

					talk, and a single group exercise session. Environmental: Negotiations with canteen operators to provide healthier meals and protected work time for exercise (3 times/week). Health Belief Model	(at least two visits) in a hospital outpatient clinic.		FBS, HbA1c, cholesterol, triglycerides. Women: Total cholesterol reduced by -0.4 mmol/L (-7.4%) in intervention and -0.3 mmol/L (-7.3%) in control. LDL cholesterol reduced by -0.3 mmol/L (-8.3%) in both groups. Time effect $p < 0.05$ (both groups improved, not specific to intervention).
5	Heng et al. (2020) (23), Kuala Lumpur, Malaysia	Obese or overweight employees from a research institute.	n=63, 38.6 (9.31), 85.7%	Single-arm, pre-post design	Health Is Wealth: High-Intensity Interval Training (HIIT) program. Protocol: 30-minute sessions, 3 times per week. Structure: 5 minutes of warm-up, 20 minutes of Tabata made up of 5 cycles of: 20 seconds of high-intensity exercise followed by 10 seconds of rest, repeated for 8 intervals per cycle.	None	10 weeks, Anthropometric and biochemical measurements	Significant reduction in weight (-1.8 kg), BMI (-0.9), total cholesterol (-0.16 mmol/L); No significant change in waist circumference or fasting glucose.
6	Bakhtari Aghdam et al. (2018) (25), Jolfa, East-Azerbaijan, Iran	Female teachers, primary and secondary schools	n=230, 115 each arm, 42 (5.4)	Randomized, controlled trial	Twice-weekly aerobic & stretch sessions at school and the formation of social support groups (including online) to encourage PA and reduce sitting.	Control group received information on reducing sitting time and access to facilities a	8 weeks, international PA questionnaire, Sallis social support scale	Significant reduction in sitting time (6 hours/week in intervention vs. 0.8 hours/week in control). Increased PA at work (399 vs. 154 MET-min/week) and leisure time (913 vs. 280 MET-min/week).

						fter the study.		
7	Chandrasekaran et al. (2025) (29), Manipal, Karnataka, India	Sedentary desk workers from large multifaceted university	n=136 SMART n=44 TRADE n=46 CONT n=46 Mean Age: 35.92 (7.35), 59.23%	Three-arm Cluster Randomized Controlled Trial	SMART-STEP intervention trial SMART: Custom smartphone app (hourly break reminders during working hours) + pedometer step challenge (10,000 steps/day).	TRADE: Traditional education (wellness manual) + self-directed activity log. CONT: Usual work routine.	6 months, ActiGraph, activity log	SMART group significantly reduced sedentary time (ST) (effect size: 0.43) vs. CONT at 3 months (-6 min/day) and 6 months (-6 min/day). TRADE group reduced ST at 3 months only. SMART group increased light-intensity PA, and daily steps at 3 and 6 months. No change in moderate to vigorous physical activity in any group.
8	Chandrasekaran et al. (2025) (28), Manipal, Karnataka, India	Sedentary desk workers from large multifaceted university	n=136 SMART n=44 TRADE n=46 CONT n=46	Part of SMART-STEP intervention trial, reported on development process of SmPh application	SMART: Smartphone app with hourly physical activity/sedentary time prompts + pedometer challenge of 10,000 steps per day, Self-Determination Theory and feedback Intervention Theory	1. TRADE: Traditional education (workplace manual) + walking log. 2. CONT: Usual care (no new intervention).	6 months, Actigraph wGT3X-BT, qualitative interview with SMART and TRADE arms	Usability testing revealed high initial app engagement (77%) that declined to 31% by month 6. Barriers: workload, lack of movement sensing, and insufficient organizational and peer support.
9	Shakerian et al. (2023) (26),	Office workers in the oil industry	n = 294 male 36.90 (7.7)	Randomized controlled trial	Theoretical: Five 50-min sessions over 3 weeks on knowledge, attitudes, self-efficacy, and organizational	After study they received a single training	3 months (with follow-up at 6 months), Baecke Habitual Physical Activity	Significant improvements in the intervention group Primary: for total PA (sports, leisure, and workplace

	Asaluyeh, Iran				support. Practical: Three 30-min sessions/week for 3 months of in-person exercise. Environmental: Established workplace health center, commuting service, provided sports clothing/equipment, and changed policies (e.g., 30-min paid activity time). Social: Group discussions, verbal encouragement, and family involvement, telephone counseling, followed Spence and Lee	session and materials	Questionnaire, maximum oxygen consumption (VO2 max) index, Jamar® Plus+ Digital Hand Dynamometer, Crunch (partial curl-up) test, Slim Guide Skinfold Caliper	activity). Secondary: Cardiorespiratory fitness (VO2 max), muscular endurance, strength, and flexibility. BMI, Body Fat %, Waist-Hip Ratio.
10	Pillay et al. (2014) (18), Durban, KwaZulu-Natal, South Africa	Employees from a tertiary academic institution (Faculty of Health Sciences).	n = 19 Intervention group: n=11, 37.6 (8.6), 82% Control group: n=8, 38.3 (7.7), 88%	Pilot feasibility randomized, controlled trial	Steps that count intervention Bi-weekly individualized email feedback on step count (average steps, highest day, aerobic steps) over past two weeks. Bi-weekly general motivational messages (such as 'be active everyday' or 'walk tall'). Strategies to increase physical activity (e.g. walk fast enough so as to increase your breathing rate yet not feel out of breath)	Received only bi-weekly general motivational messages.	10 weeks, pedometer, physical measurements, self-reported questionnaire	Primary Pedometer as a useful motivational aid and a reminder to increase steps per day. Barriers Occupational sitting time and inability to incorporate PA into daily routine. Secondary: Intervention group increased daily steps by ~1,000. Modest improvements in waist circumference, body fat, BMI, Body weight, systolic blood pressure.

11	Garcia-Rojas et al. (2021) (32), Mexico	Workers from seven diverse companies (cooking utensils factory, government public health services department, metalworking company, pharmaceutical company, plastic factory, printing company)	n = 2,002, 36.8 (10.6), 36.8%	Prospective, quasi-experimental study	Worksite health promotion (WHP): Nutrition: Individualized counseling & group sessions based on BMI. Physical Activity: Daily 30-min exercise sessions during work shifts, individualized by fitness level. Stress Management: Weekly group sessions on techniques and coping strategies.	No intervention	6 months (with 6- and 12-month follow-up)	Intent-to-Treat Analysis: Modest, uncertain BP reduction in intervention vs. control at 12 months (e.g., SBP: -1.6 mmHg, 95% CI: -3.7, 0.6). Subgroup Analysis: Participants with diabetes, the intervention had a much stronger effect: Systolic BP: -13.0 mmHg (95% CI: -16.0 to -10.1), Diastolic BP: -6.1 mmHg (95% CI: -11.2 to -1.2)
12	Ganesan et al. (2016) (30), International level study	Employees from 481 workplaces (90.2% from India)	n=69,219 (pre-event) Completers: 36,562 (post-event) 36.0 (8.4), 23.9%	Prospective cohort study	Stepathlon Program: A 100-day, team-based, workplace pedometer program. Used low-cost pedometers and a multi-platform app/website for self-monitoring, daily motivational emails, social networking, and expert chats. Focused on increasing daily steps and reducing sitting.	None	100-day events (2012–2014), Web-based physical activity and life-style survey questionnaires	Significantly increased daily step count by +3,519 steps/day (95% CI: 3,484 to 3,553). Number of exercise days per week increased by +0.89 days (95% CI: 0.87 to 0.92). Sitting duration decreased by -0.74 hours per day (95% CI: -0.78 to -0.71). Average weight loss of -1.45 kg (95% CI: -1.53 to -1.38).
13	Dunning et al. (2018) (19), Johannesburg, South Africa	Office workers with sedentary desk-based jobs (≥5 hours/day sitting) from university	Total Randomized : 21 Analyzed (Activity): 14 Age: 27.5 (5.7), 57%	Pilot Randomized Controlled Trial	PROMPT Group: Received mobile phone text messages every 30 minutes during work hours (09:00-17:00, Mon-Fri). Messages prompted participants to	Control group continued usual work routines without prompts.	10-week, ActivPAL and ActiGraph GT3Xp accelerometer, e international physical activity questionnaire-short form, validated	Primary: PROMPT group sat for 1.1 hours less per workday during the intervention period. Secondary: No significant changes in blood pressure,

					stand and perform a short, light-intensity task (e.g., fetch water, visit a colleague). Social cognitive theory		sedentary behavior questionnaire, physical and biochemical measurements, Maximal oxygen consumption (VO2max) was measured using a progressive incremental exercise test to volitional fatigue, on a treadmill.	cholesterol, triglycerides, glucose metabolism (insulin, HOMA-IR), and the proposed mechanistic marker, serum Lipoprotein Lipase concentration.
14	Phaswana et al (2023) (21), Johannesburg, South Africa	Office-based workers from a university and a credit bureau	n=62 Intervention =44 Control=18, 40.3(10.1), 79.0%	Randomized Controlled Trial,	Height-adjustable sit-to-stand workstation installed on existing desk, plus ergonomic training, regular encouragement by researchers, and educational communication.	Continued use of traditional seated desk, with only verbal information on the health risks of prolonged sitting.	12 weeks, AX3 accelerometer, physical and biochemical measurements	Decreased sedentary behavior in intervention group (-9.3 min/day). Light physical activity increased in intervention (+4.1 min/day). Moderate to vigorous activity increased in both groups. Small effect sizes for most outcomes (e.g., BMI d=-0.11; Diastolic BP d=-0.26). total cholesterol measures d=-0.11
15	Schouw et al. (2020) (20), Cape Town, South Africa	Employees at a commercial power plant	Baseline: 156 Follow-up (Paired): 137, 42.7 (9.7), 36%	Before-and-after study (Single-arm)	Healthy Choices at Work Programme (HCWP): Food: Subsidized "wellness meals," free fruit, healthy snacks. Physical Activity: Monthly sports days, functional exercise classes,	No control group	24-months, South African Demographic Health Survey Questionnaire, Global Physical Activity Questionnaire, Alcohol Use	Significant increase in fruit/vegetable intake (27% to 64%) and physical activity (44% to 65%). Significant decrease in harmful alcohol use (21% to 5%). No change in smoking. Significant improvements

					lunchtime walks/runs. Health Services: Health Risk Assessments, feedback, behavior change counseling, wellness newsletters. Leadership: Managerial buy-in and participation. participatory action research		Disorders Identification Test, physical measurements	in systolic BP (-10.2 mmHg), diastolic BP (-3.9 mmHg), and total cholesterol (-0.45 mmol/L). No change in BMI, waist circumference, or random glucose. Significant reduction in stress. No significant change in 10 year cardiovascular risk score.
16	Hassani, B., et al., (2020). Mahshahr, Khuzestan, Iran. (27)	Male employees of Razi Petrochemical Company with at least one blood lipid abnormality, working in shift cycles.	n= 92 (Education: 48, Control: 43), 42.3 (9.13)	Randomized controlled trial	A 3-month priority-oriented nutrition education program based on the Theory of Planned Behavior (TPB). Five educational workshops on healthy nutrition and exercise. Distribution of healthy snack packages at each session. Educational booklets and family involvement (one session for family members). Weekly automated text messages (3 per week). Telephone follow-ups at weeks 4 and 8.	Routine medical care only (no nutrition education)	3 months, food frequency questionnaire, self reported questionnaire and medical records, physical and biochemical measurements	Intervention group showed above 50% improvement in nutritional knowledge ($P < 0.001$) Body weight and BMI were lowered by 0.7 kg in the intervention group ($p < 0.05$), declines in intake of sweets, soft drinks, cake and cookie, and snacks. Fasting blood sugar and HbA1c levels improved ($p < 0.05$). Serum levels of hs-CRP showed no significant changes while homocysteine levels were reduced to 1.87 $\mu\text{mol/L}$ ($P \text{ value} < 0.05$)