

## Middle-aged Health Checks Program Outputs in Non-communicable Diseases Screening in Iran

### Abstract

**Background:** The aim of the present study is identifying the outputs of middle-aged health checks program (MAHCP) in Isfahan province in central of Islamic Republic of Iran. **Methods:** This is a cross-sectional study. During 30 months, from March 2014 to September 2016, 30–59 years old females and males were screened for abdominal obesity, overweight, obesity, physical inactivity, dyslipidemia, hypertension, diabetes, and also breast, skin, cervix, colorectal, and prostate cancers in all health houses, health posts, and health centers in the province. Based on the data bank of the family health office of the health center of Isfahan province, we estimated the outputs of MAHCP.

**Results:** The utilization rate of MAHCP was 0.39–273.06 per 1000 middle-aged population (MAP). The utilization rate in 2015 was higher for women (43.02–273.06 per 1000 MAP), particularly in rural areas (273.06 per 1000 MAP). The case detection rate of physical inactivity was 26.40–498.6, abdominal obesity was 16.50–428.38, overweight was 38.73–365.59, obesity was 3.30–261.99, and body mass index (BMI)  $\geq 25$  was 63.21–593.41 per 1000 MAP. Also dyslipidemia was 21.51–171.62, hypertension was 12.33–53.88, and diabetes mellitus was 10.71 – 36.99 per 1000 MAP. Cancers detection rate in women included: breast cancers (99.52–330.32), skin (14.24–245.52), cervix (11.94–87.43), and colorectal (0–47.4) per 100,000 MAP. Cancer detection rate in men included: skin (0–59.18), colorectal (0–80.06), and prostate (0–42.03) per 100,000 MAP.

**Conclusions:** The MAHCP utilization rate in both the genders, particularly in men, was lower than it had been expected.

**Keywords:** Cancer, diabetes mellitus, dyslipidemia, hypertension, screening

Marjan Movahedi,  
Ziba Farajzadegan,  
Reza Khadivi

Department of Family and  
Community Medicine, School of  
Medicine, Isfahan University of  
Medical Sciences, Isfahan, Iran

### Introduction

More than 76% of the total disease burden in Iran occurred due to non-communicable diseases.<sup>[1]</sup> Behavior risk factors in chronic non-communicable diseases including: tobacco smoking, unhealthy diet, insufficient physical activities, and drinking alcoholic beverages lead to non-communicable diseases such as overweight, obesity, hypertension, hypercholesterolemia, and diabetes mellitus, and finally they may cause premature death.<sup>[2]</sup>

The middle-aged health check program (MAHCP) in Iran was integrated in health delivery system from 2013 in two forms: Saba program (Iranian women health) and Sama program (Iranian men health) and in three major parts including lifestyle improvement, promoting reproductive health, and general health. The goals of this program was improving the middle-aged life quality, promoting lifestyle, early diagnosis of risk factors

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and important diseases in target groups (30–59 years old), and finally prevention of disability and premature death due to non-communicable diseases.<sup>[3]</sup>

The current study was designed to investigate the MAHCP's outputs in Isfahan province for the first time in Iran. It seems that the results of the present study can be applied to develop the MAHCP.

### Materials and Methods

In a cross-sectional study, the output of national MAHCP (females and males aged 30–59 years) in Isfahan province was evaluated during 30 months from March 2014 to September 2016. The studied population during 2014–2016, according to annual census will be 1704,158, 1696,424, and 1855,775 individuals, respectively. This program was standardized by the Family Health Office of the Health, Treatment and Education Ministry, so the service package would be presented by the health team (caregiver, midwife, and physician). In the first annual census, the

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### Address for correspondence:

Dr. Reza Khadivi,  
Department of Community and  
Family Medicine, School of  
Medicine, Isfahan University of  
Medical Sciences, Isfahan, Iran.  
E-mail: [khadivi@med.mui.ac.ir](mailto:khadivi@med.mui.ac.ir)

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health personal should identify all of the middle-aged that were covered by the health center and then register their numbers and names. Afterwards, different approaches should be used to invite these groups to the health center in order to encourage them to participate in the program and also the opportunistic screening should be introduced simultaneously. All MAHCP offered to the target groups are free of charge. The caregivers present this service package including body mass index (BMI) calculation, blood pressure measurement, lifestyle investigation (diet, physical activity, and substance abuse), psychological evaluation, immunization history, allergy, and career injury factors. Training and consultation would be presented according to instruction. Reproductive health such as sexual transmission infections, genitourinary diseases, infertility, menopause and its related disorders, gynecologic carcinomas, clinical breast examination, and Pap smear for women would be evaluated by midwives, and for men by caregivers or male physicians. In addition, if necessary, treatment and follow up would be carried out. The physicians would manage diagnosis, treatment, and prevention of major non-communicable diseases, psychological disorders, musculoskeletal, and respiratory disease, cancers, and their risk factors. Each individual's medical history will be registered according to evidences (medical records, laboratory tests, or the patient's medicines). The patients' statements would not be diagnosed by examinations alone, but if necessary para-clinic will be used. It would be noteworthy to say that according to the MAHCP guidelines, the expected coverage rate was 70% 3 years after the implementation of the program.<sup>[3]</sup>

The present study has used some statistics related to anthropometric measurements (BMI, waist circumference), physical inactivity (based on patients' history), hypertension, diabetes mellitus, dyslipidemia, and common cancers such as breast, cervix, colorectal, skin, and prostate). Unfortunately, data about other variables that mentioned earlier were not collected properly and they were excluded from this study.

After the integration of the MAHCP, the data from each health house, health post, and health center were sent to the 21 district health networks monthly and subsequently the data were sent to the provincial health center every 3 months. The data were gathered through data bank in the family health office of the Isfahan provincial health center.

### Inclusion criteria

The data were collected from the 30–59 years old population that were covered by 483 health houses (in rural areas), 224 health posts (in urban areas), and 217 health centers (rural and urban) in Isfahan province.

### Unmet criteria

The data about 30–59 years old population from other provinces that did not stay in Isfahan province were not included in the study.

### Exclusion criteria

The data of the 30–59 years old population that were not confirmed by the general physicians were excluded from the study.

Ultimately, the data were entered into the SPSS 20 software and relative frequency was used to describe the data.

### Results

Middle-aged people (MAP) in Isfahan province that received MAHCP varied from 0.39 to 273.06 per 1000 MAP. Women in the range of 43.02–273.06 and men in the range of 0.39–21.85 per 1000 MAP were assessed in MAHCP. The most cooperation level belonged to rural women as 273.06 per 1000 MAP in 2015. The highest cooperative level of men belonged to rural men as 21.85 per 1000 MAP in 2016 [Graph 1].

The physical inactivity case detection rate ranged: 26.40–498.6, overweight: 38.73–365.59, obesity: 3.3–261.99, BMI  $\geq 25$ : 63.21–593.41, and abdominal obesity: 16.5–428.38 per 1000 MAP [Graph 2].

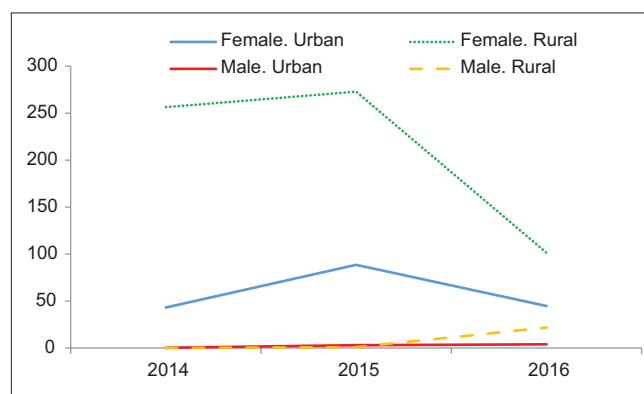
The case detection rate of dyslipidemia ranged: 21.51–171.62, hypertension: 12.38–53.80, and diabetes mellitus: 10.71–36.99 per 1000 MAP [Graph 3].

Cancers detection rate in women included breast cancers: 99.52 and 330.32, skin cancers: 14.24 and 245.52, cervical cancers: 11.94 and 87.43, and colorectal cancers: 0–47.4, per 100,000 MAP [Graph 4].

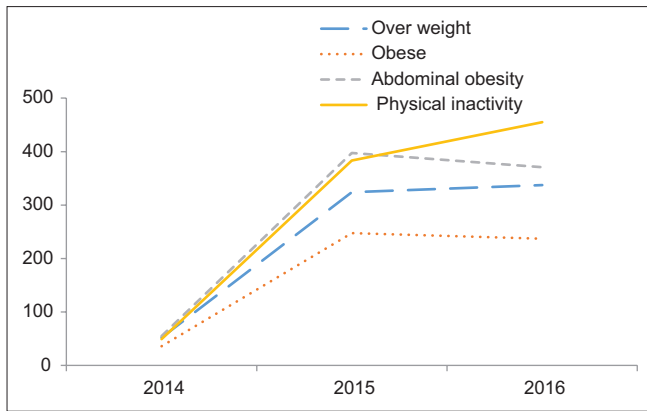
Cancer detection rate in men included skin cancers: 0–59.18, colorectal cancers: 0–80.06, and prostate cancers: 0–42.03, per 100,000 MAP [Graph 5].

### Discussion

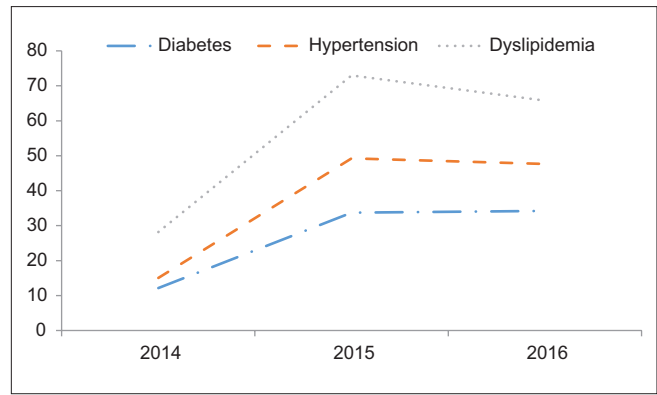
The current study estimated the outputs of MAHCP in Isfahan province from March 2014 to September 2016 during a 30-month period. MAP in Isfahan province that received health check programs varied from 0.39 to 273.06 per 1000 MAP. The results have been illustrated that the highest level



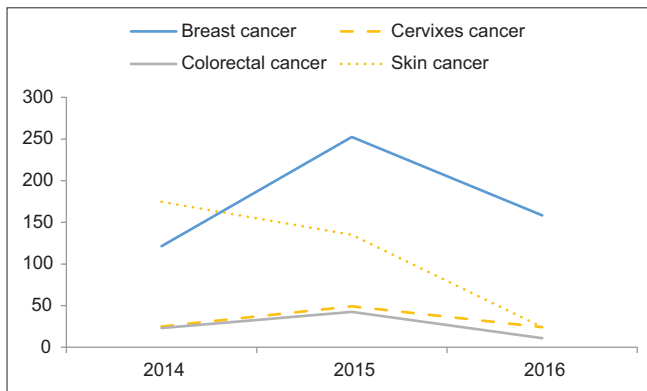
Graph 1: The rate of case finding in MAHCP in Isfahan province per 1000 population, 30–59 years old from 2014 to 2016



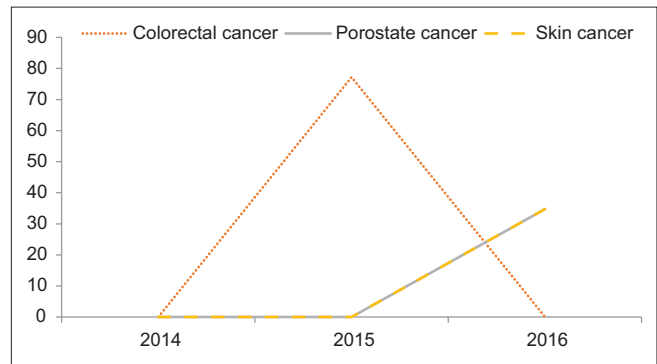
**Graph 2:** The rate of case finding for overweight, obesity, abdominal obesity, and physical inactivity in MAHCP in Isfahan province per 1000 population, 30–59 years old during 2014–2016. Over weight: Body mass index = 25–29.9 kg/m<sup>2</sup> Obese: Body mass index ≥30 kg/m<sup>2</sup> Abdominal obesity: Waist circumference ≥90 cm Physical activity lower than 30 minutes daily, or lower than 150 minutes weekly



**Graph 3:** The rate of case finding for hypertension, diabetes mellitus, and dyslipidemia in MAHCP in Isfahan province per 1000 population, 30–59 years old during 2014–2016. Hypertension: Systolic blood pressure ≥140 mm Hg or diastolic blood pressure ≥90 mm Hg Diabetes: Fasting blood sugar ≥126 mg/dl Dyslipidemia: Triglyceride ≥150 or total cholesterol ≥200 or HDL <40 (for men) and <50 (for women), LDL ≥160 in people without risk factor or with one risk factor excluding diabetes, LDL ≥130 in people with two risk factors, LDL ≥100 in people with diabetes or cardiovascular disease history



**Graph 4:** The rate of women's cancer case finding as: breast, cervix, colorectal, and skin in MAHCP in Isfahan province per 100,000 population, 30–59 years old during 2014–2016



**Graph 5:** The rate of men's cancer case finding as: colorectal, prostate, and skin in MAHCP in Isfahan province per 100,000 population, 30–59 years old during 2014–2016

of receiving health checks in both the genders was related to rural areas and women utilized health checks services more than men. Similarly, in diabetes mellitus screening program in non-diabetic 50–70 years old persons in south west of Netherlands, rural population had more cooperation than urban population (32.7% versus 29.2%).<sup>[4]</sup>

Iranian health delivery system is highly organized in rural area in comparison to urban areas, and additionally, most of the health services in rural areas are delivered in an active route instead of the passive health care delivery routes in urban areas.

In a study by Ealovega *et al.* (2004) an opportunistic diabetes screening program has been conducted during 3 years in people older than 45 years in the USA. However, only 69% of the target population were screened and the women's cooperation in health check programs were higher than men's.<sup>[5]</sup> In addition, in a cohort study in order to evaluate the yield of NHS Health Checks in England (2010–2013) during 3 years, similar to this study's result, women's cooperation were more than men's.<sup>[6]</sup>

Also, in Wangchuk *et al.* (2014) study in Bhutan that was carried out on the people over 40 years of age as a package to screen non-communicable diseases (PEN) 60% of participants were women, and the women's cooperation were higher than men's.<sup>[7]</sup> Obviously, women insist on their health more than men, furthermore the health centers time is overlapped with working hours.

In MAHCP in Isfahan province, maximum 273.06 per 1000 MAP received health check program, but in Wangchuk *et al.* (2014) study in Bhutan, the utilization rate reached to 71.4%.<sup>[7]</sup> So the cooperation level in receiving health checks in both the genders in this study, has been lower than the expected level and also in comparison with the other studies in other countries.

The rate of cases detected with abnormal BMI (25 and above) in this study is roughly similar to 2016 STEPS's results in Iran (59.3%) and in Isfahan province (61.3%).<sup>[8]</sup> According to the World Health Organization (WHO) (2016), 39% of the population >18 years old in the world have been

overweight and 13% have been obese.<sup>[9]</sup> The rate of cases detected with overweight has been higher than that with obesity and this is similar to STEPS study's results.

In Wangchuk *et al.* (2014) study in Bhutan that has been conducted to screen non-communicable diseases, abdominal obesity was reported as (65.2%), overweight (57.1%), and obesity (17.6%). It was similar to this research that illustrated more frequent abdominal obesity than overweight and obesity.<sup>[7]</sup>

The rate of physical inactivity in middle-aged program has been less than the STEPS's 2016 results in Iran (90.3%) and in Isfahan (89.8%).<sup>[8]</sup> According to the WHO reports (2017), 23% of adults in the world have physical inactivity and women are more inactive than men.<sup>[10]</sup> The rate of physical inactivity in the current research has been higher than the WHO report, but similar to the WHO report physical inactivity in adults in this study is more common in women than men.

Among cardiovascular disease risk factors, the most common risk factor was dyslipidemia, and after that hypertension, and diabetes stands in the next ranks.

In this study, cases detected with dyslipidemia varied from 21.51 to 171.62 per 1000 MAP. According to Forster's study, that evaluated the yield of NHS Health Checks in England (2010–2013) on people aged 40–74 years, for every 1000 men being assessed, there were 633 (607–658) individuals with elevated total cholesterol. Among 1000 women, there were 668 (646–689) individuals with elevated total cholesterol.<sup>[6]</sup> It seems again, the case finding suffering dyslipidemia in present study is lower than similar studies in other countries.

In the present study, the cases detected with hypertension varied from 12.38 to 53.80 per 1000 MAP. The hypertension prevalence rate based on the results of 2016 STEPS's study was 25.4% in Isfahan and 27% in over 25 years old population in the whole of Iran.<sup>[8]</sup> Based on Forster's study, there were 355 (340–369) men and 247 (238–257) women per 1000 persons aged 40–74 with hypertension.<sup>[6]</sup> Therefore, hypertension case detection rate was very lower than its real prevalence rate in Isfahan province and in comparison with case detections in another study.

Diabetes mellitus case detection rate in this study ranged from 10.71 to 36.99 per 1000 MAP. Diabetes mellitus prevalence rate reported in STEPS's study (2016) varied from 11.6% in Isfahan province to 9.5% in over 25 years in Iran. In addition, the prevalence of high cholesterol, hypertension, diabetes, obesity, and physical inactivity are higher in women. All of them except hypertension are more prevalent in cities.<sup>[8]</sup> Following diabetes mellitus screening in Netherlands in non-diabetic 50–70 years old persons, 1% excess diabetic persons were detected and the prevalence rate of diabetes was estimated as 3.1% in this population.<sup>[4]</sup>

In an opportunistic screening program that was carried out on 49,229 individuals aged 45–70 years and with a low risk of diabetes mellitus, the prevalence rate of diabetes increased from 6.1% to 6.8%.<sup>[11]</sup>

In Hersberger *et al.*<sup>[12]</sup> study in Switzerland that was conducted in 2006 in order to screen diabetes, 6.9% of diabetic cases were reported. In Edelman *et al.* (2002) study; an opportunistic screening program conducted in the centers dependent on Durham University in the USA on 45–64 years old patients 4.5% of unknown diabetes cases have been diagnosed.<sup>[13]</sup> The diabetes case detection results in MAHCP has been lower than those studies. Despite of the higher prevalence of obesity, physical inactivity and diabetes mellitus in urban areas, the cooperation of the population in the rural areas for receiving health checks program are higher than the population in the urban areas.

Breast cancer detection ranged between 99.52 and 330.32 per 100,000 in middle-aged women in 30 months. Breast cancer is the most common cancer in the Iranian women.<sup>[14]</sup> According to Berry's study (2017), the highest incidence rate of breast cancer has been reported in the Netherland, France, and USA as 95.3, 94.6, and 90.6 (per 100,000 white women), respectively. The lowest breast cancer's incidence rate has been reported in Thailand, Algeria, and India as 25.6, 29.8, and 30.9 (per 100,000 women), respectively.<sup>[15]</sup> In Siegel *et al.* (2018) study, breast cancer's incidence rate was reported as 123.6 per 100,000 women in the USA.<sup>[16]</sup> In Enayatrads *et al.* (2016) study, the breast cancer's incidence rate has been 27.4 per 100,000 women in Iran.<sup>[17]</sup> It seems that the MAHCP detected higher rates of breast cancer than those studies even in a 30 months' interval. However, this could be because of the risk of lead-time bias, so according to logical reasoning, long-term follow up would be necessary. The yield of breast cancer screening program in Lehman *et al.* (2007) study was 3.5% (in 171 women aged  $46 \pm 10.2$  years).<sup>[18]</sup> The yield of breast cancer screening in MAHCP is higher than the Lehman's study. This may be due to the first years of the measurement and the higher population awareness in the recent years by mass media about the breast cancer risk and the benefits of its early detection in women in the Isfahan province.

Skin cancers' case detection rate in the present study varied from 0 to 59.18 in 100,000 middle-aged men and 14.24 to 245.52 in 100,000 middle-aged women. In Enayatrads *et al.* (2016) study conducted on Iranian cancer statistics (2004–2009), skin cancer was the most prevalent cancer in both the genders.<sup>[17]</sup> That is not similar to this study. In Razi *et al.* (2015) study, the skin cancer's incidence rate in Iran was reported as (13.08–15.50 per 100,000). The skin cancer's incidence rate in Isfahan province in men was 30.8 per 100,000 population that stayed on the second rank in Iran and in women, the skin cancer's incidence rate was 18.97 per 100,000 that also stayed on the third rank in Iran.<sup>[19]</sup> Skin cancer's detection rate in MAHCP has been

higher in women than in men in comparison with relevant studies. It seems that low skin cancer's detection rate in men occurred due to low cooperation of men in MAHCP.

The case detection rate of cervical cancer in the present study was 11.94–87.43 per 100,000 middle-aged women in 30 months. In Castanon *et al.* (2018) study conducted on cervical cancer screening in England, the cervical cancer's incidence rate was reported as 15.1 per 100,000 women.<sup>[20]</sup> In Siegel *et al.* (2018) study, cervical cancer's incidence rate in the USA was reported as 7.6 per 100,000 women.<sup>[16]</sup> In Zendehdel (2018) study, cervical cancer's incidence rate in Iran was 4 per 100,000 women.<sup>[21]</sup> According to the WHO reports, cervical cancer is the fourth cancer in women and its incidence rate is 7.9 per 100,000 women yearly.<sup>[22]</sup> So cervical cancer's detection rate in MAHCP has been higher than the incidence rate that was reported in other national and international studies, even though they stayed on different ranks. The higher cervical cancer's case detection rate in the present study may be due to the mass media awareness programs and the initial phase of cancer screening. For the precise interpretation about the incidence rate of cervical cancer, however, it should be re-examined in the long-term program monitoring.

Based on the data of MAHCP, the colorectal cancer's detection rate in women varied from 0 to 47.4 and in men it was 0 to 80.06 per 100,000 MAP.

In Enayatrad *et al.* (2016) study, colorectal cancer's incidence rate has been as 10.14 per 100,000 in men and as 9.3 per 100,000 in women (>50 years old) in Iran.<sup>[17]</sup> In Rafiemanesh *et al.* (2016) study, colorectal cancer has been ranked as the third common cancer in men and the fourth one in women in Iran.<sup>[23]</sup> The highest incidence rate of the colorectal cancer has been reported from Australia and New Zealand as 39 per 100,000 and the lowest one has been reported in Africa, India, and China as 3.6 per 100,000.<sup>[22]</sup> In the USA, colorectal cancer's incidence rate has been 34.8 and 45.9 (per 100,000) in women and men, respectively.<sup>[16]</sup> In MAHCP, the colorectal cancer's detection rate in men has been higher than women and that is similar to national studies and the results of the other countries. In this study, the colorectal cancer's detection rate in women is higher than the national report and also it is roughly similar to the incidence rate of colorectal cancer in the USA. Colorectal cancer's detection rate in men was higher than either national or the USA statistics. It seems that women received higher rates of screening measurements than men did.

In the present study, prostate cancer's detection rate varied from 0 to 42.03 per 100,000. Whereas prostate cancer's incidence rate (2004–2009) reported as 11 per 100,000 in Iran.<sup>[17]</sup> In Siegel *et al.* (2018), the prostate cancer's incidence rate in the USA has been as 114.9 per 100,000.<sup>[16]</sup> Prostate cancer's case detection rate in MAHCP is higher than the national statistics but lower than the international report.

Limitations: Unfortunately, in 2014, MAHCP had not been implemented in rural men. In addition, cancer cases were identified based on the existence of documentations indicating approved cancers, such as pathological reports in addition to mammography for breast cancer and Pap smear for cervical cancer, colonoscopy, and biopsies in the recent years. This study probably overestimated the cancer detection rate because it included all of the detected cancers in the recent years according to the documentations that the patients presented to the health centers. So implementation of longitudinal study on this program, can revise those defects.

## Conclusions

The MAHCP utilization rate was lower than expected. In both the genders, the highest health check utilization rates were in rural areas. Women had received higher health checks than men particularly in cancer screening programs. Case detection rates in diabetes mellitus, hypertension, and dyslipidemia, in the present study were lower than the expected rates. However, case detection rates for breast, cervical, and colorectal cancers in the present study were higher than the recent national reports.

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## Conflicts of interest

There are no conflicts of interest.

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