

PRIMARY HEALTH CARE DEVELOPMENT IN POLAND

PHC PLUS EVALUATION



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LIST OF ACRONYMS AND ABBREVIATIONS

ADL	Katz index of independence in activities of daily living
AP-PKUS	system for handling the process of coordinated patient care
CAPI	computer assisted personal interview
CATI	computer assisted telephone interview
CAWI	computer assisted web interview
COPD	chronic obstructive pulmonary disease
CT	computed tomography
CUA	cost-utility analysis
DMP	disease management program
EKG	electrocardiogram
EQ-5D-5L	health-related quality of life measure questionnaire
ER	emergency room
FCI	fragmentation of care index
GDPR	general data protection regulation
GINA	the global initiative for asthma guidelines
GP	general practitioner
HbA1c	hemoglobin A1C
HLS	health literacy survey
ICD	international classification of diseases
IT	information technologies
KLP	costs of patient treatment
MCID	minimal clinically important difference
MRI	magnetic resonance imaging
MSQ	Minnesota Satisfaction Questionnaire
NHF	National Health Fund
NHS	National Health Service, United Kingdom
NPRS	numeric pain rating scale
ODI	Oswestry disability index
OSC	outpatient specialized care
P value	probability test
PAID	problem areas in diabetes
PAPI	paper and pencil interview

PHC	primary health care
PHC Plus	primary health care plus, also known as POZ Plus in Polish
PPIC	patient perception of integrated care
PREM	patient-reported experience measure
PROM	patient-reported outcome measures
QALY	quality-adjusted life year
SGRQ	Saint George's Respiratory Questionnaire
WHO	World Health Organization

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1. INTRODUCTION

Since the introduction of universal health insurance in Poland in 1999, there have been several reforms of the production, delivery, and management of the health system aimed at protecting and improving the health status of Polish citizens. These reforms have introduced new provider payment mechanisms, greater autonomy for hospitals, decentralization in health care administration, and recognition of patient choice. On the delivery side, the Siemaszko system, which was characterized by centralized organization and financing, was replaced by a health system staffed by family doctors and general practitioners providing outpatient care and a vast loosely defined network of hospitals. On the financing side, the budgetary funded system was replaced by a social insurance system that provided universal health insurance to all citizens of the country through 16 regional health insurance funds, which were reorganized in 2003 into a single centralized insurance agency in charge of contracting with public and non-public health care providers. Another focus of the reform process was the creation of a new primary care specialty and the development of a new role for general practitioners as gatekeepers to the rest of the health system. The Ministry of Health remained the key policymaker and regulator for the system.

The initial results of the reforms have been promising. In many respects and compared to other countries that joined the EU around the same time as Poland, the health system performed quite effectively and delivered services at a reasonable cost. The Social Health Insurance system provided access to a broad scope of benefits, and mortality from preventable and treatable causes started to decrease over the years while average life expectancy increased by eight years between 1990 and 2019. Per capita health spending went up from US\$238 in 2000 to US\$2,289 in 2019, representing an increase of 860 percent. As a percentage of GDP, health spending increased from 5.3 percent to 6.5 percent during this period.

However, the widespread reforms were not deep enough and the increase in resources not high enough to resolve many of the structural and systemic challenges embedded in the health sector. Consequently, health care governance has remained fragmented, with the Ministry of Health sharing the responsibility for health care with three levels of territorial government: (i) municipalities (gmina), which oversee primary care; (ii) counties (powiat), which mostly run smaller county hospitals; and (iii) districts (voivodeships), which manage larger district hospitals. The availa-

bility of financial resources in the health sector increased in recent years as the Polish economy grew and health spending accounted for a larger share of the GDP, but relative to the EU average of 9.3 percent of GDP in 2018, Poland's health sector received only 6.3 percent of the country's GDP in the same year. Inefficient use of available resources further exacerbates the situation, with health spending being heavily skewed toward expensive hospital care. As a result of the unresolved fragmentation and limited financial resources, the broad entitlements guaranteed on paper are not always available in practice, while there are severe shortages of health workers, and waiting times are long for many services provided by specialists.

The Polish health system does not compare favorably with rest of EU in a range of respects. Almost 70 percent of its health care spending came from public sources, a lower share than the average for EU (79 percent). Life expectancy at birth has increased markedly in the last two decades but remains three years lower than the EU average. Unmet medical needs are higher than the average for the EU, mainly due to long waiting times. Fewer Poles report being in good health compared to citizens of other EU countries, and this is particularly the case among poor people. Overall, patients spend considerable time and effort navigating the sector across different providers and generally do not have a good experience with the health care system.

Given this situation, the government is introducing several measures to improve patient experience in the health sector. New provider payment mechanisms are being developed to enhance quality control, strengthen personnel expertise, and evidence-based decision making. Several new programs are being introduced to improve care coordination for specific conditions or population groups, such as cancer patients, and new programs are being piloted, for example, in psychiatric care. Care coordination programs are also covering activities in the areas of health promotion and prevention across different providers, and providers are being incentivized financially (through pay-for-performance) and by being given preferential treatment in the contracting process.

In 2017, a law was passed that strengthened the coordination of primary care by introducing multidisciplinary primary care teams to coordinate care pathways, including post-hospital treatment and rehabilitation. In 2018, the National Health Fund (NHF) began to pilot test this approach in an integrated primary health care program, called PHC Plus. Designed to be a purposeful collaboration between a patient's family doctor and other primary health care providers (such as nurses, education specialists, nutritionists, care coordinators, and, sometimes, specialist care doctors), PHC Plus aims to enrich patients' experience and enhance quality of care by decentralizing competencies to the lowest effective level and by encouraging open communication between the medical practitioner, the patient, and their family.

The World Bank provided support for the development and implementation of the monitoring and evaluation (M&E) of the PHC Plus pilot, which was carried out in selected primary care centers all over Poland between July 2018 and September 2021. The program was funded from the NHF budget and the European Social Fund. This report presents the results of the evaluation and is organized as follows. Section 2 outlines the key features of the PHC Plus pilot. Section 3 discusses the evaluation methodology and data sources. Section 4 presents the detailed results of the evaluation. Section 5 contains recommendations for scale-up of the PHC Plus approach, and Section 6 concludes.

2. THE PHC PLUS PILOT

The PHC Plus pilot program was conceived as a way to step up the coordination of care in a bid to increase patient satisfaction, enhance the quality of care, increase access to services, overcome fragmentation in the delivery of care, enrich people’s care experiences, and improve care outcomes. Organized around the health needs of individuals and their families, the pilot is based on the expectation that integrating care at the primary health care (PHC) level will help Poland to overcome the lingering unresolved issues in its health system and achieve its vision of service delivery reform.

2.1 DEFINING PEOPLE-CENTERED INTEGRATED CARE

The World Health Organization (WHO) defines people-centered care as “an approach to care that consciously adopts the perspectives of individuals, families, and communities and sees them as participants as well as beneficiaries of trusted health systems that respond to their needs and preferences in humane and holistic ways.” It defines integrated care as “health services that are managed and delivered in a way that ensures that people receive a continuum of health promotion, disease prevention, diagnosis, treatment, disease management, rehabilitation, and palliative care services, at the different levels and sites of care within the health system, and according to their needs throughout their life course.”¹

In addition to responding to patients’ needs and perspectives, this approach prioritizes the coordination of services across the spectrum of care, from promotion and prevention to curative and palliative needs, to reduce fragmentation and wasteful use of resources throughout a health system. Effective patient-centered integrated care emphasizes primary care as the first point of contact for patients for most of their healthcare needs and as the coordinator of care from other providers at different levels of the healthcare system and across the full spectrum of health needs.

Primary health care, which is organized around the health needs of individuals and communities rather than around diseases, is the foundation of patient-centered integrated care. The evidence shows that better outcomes are achieved if integrated

1 <https://interprofessional.global/wp-content/uploads/2019/11/WHO-2015-Global-strategy-on-integrated-people-centred-health-services-2016-2026.pdf>; pp10-11

care models embrace at least four strategic directions at the service delivery level: (i) reorienting the model of care by increasing the role played by primary health care and reducing the extent to which hospitals are the nexus of care for most patients; (ii) integrating providers across care levels and among types of services; (iii) continuously improving the quality of care; and (iv) engaging people to make better decisions about their health and health-seeking behavior.

While the results presented in other countries are often context-specific and are based largely on evidence from initiatives in high-income countries, our preliminary findings suggest that gains can be made in outcomes, quality, and patient experience from adopting this approach. For patients and their families, primary care integration can lead to increased access to timely care, better relationships with care providers, better care coordination across providers and settings, and increased satisfaction. Additionally, increasing the involvement of patients and their families in shared decision-making and care planning with providers increases their health literacy and strengthens their decision-making capabilities, which can promote their independence and their ability to self-manage and control long-term health conditions. For health professionals, integrated primary health care models can help to optimize their workloads, reduce burnout, and increase their job satisfaction.

2.2 THE ROLE OF PRIMARY HEALTH CARE IN POLAND

Primary health care (PHC) is the part of the health care system that provides all eligible Poles (in other words, the insured) with access to specific health services on an outpatient basis or, in medically justified cases, at the patient's home. It also includes preventive care for children and youths provided by a nurse/hygienist in educational institutions.

In financial terms, almost entire financing of the PHC is based on capitation rate, which is a monthly fee for the care of the group of patients declared to the PHC doctor, nurse and midwife.

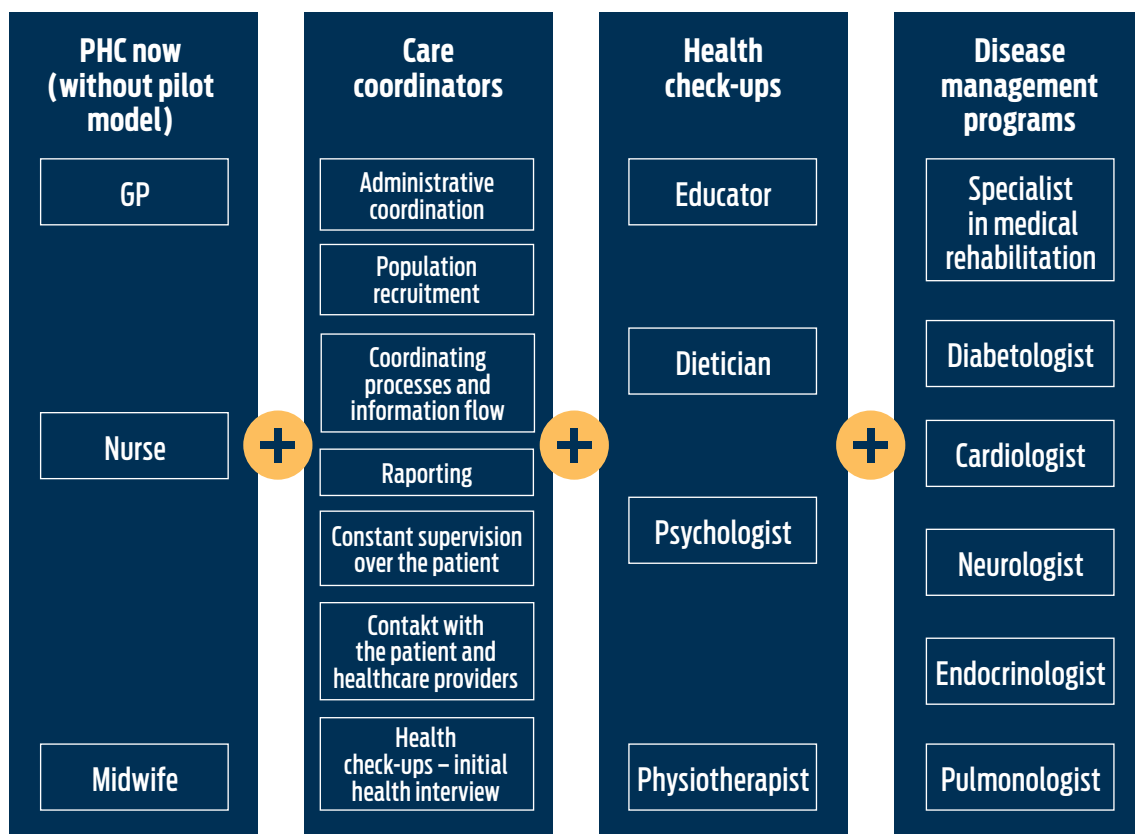
Currently, the PHC services offered in Poland cover: (i) the provision of disease prevention services and immunization; (ii) consultations on the treatment of diseases; (iii) laboratory, imaging, and non-imaging diagnostics (such as ECGs, X-rays, and ultrasounds); (iv) treatment in clinics and in the patient's home; (v) the prescription and management of medicine and medical devices; (vi) the verification of health conditions; (vii) the issuing of referrals to specialist clinics, hospitals, rehabilitation services, and spa treatments and others.

2.3 THE AIM AND DESIGN OF THE PHC PLUS PILOT PROGRAM

The PHC Plus pilot program was conceived as a vehicle to offer high-quality services to meet patients’ health needs and to deliver health care both in sickness and in health rather than providing sporadic medical interventions in response to acute conditions.

The expanded primary health care model, or PHC Plus, covers the original scope of services delivered in PHC but also offers a range of additional services such as out-patient specialist care (OSC) and ambulatory physical therapy. In addition, PHC Plus facilities provide participants with health check-ups and access to a range of disease management programs (DMPs). It also offers patients access to a broader range of competencies than the basic primary care team, which consists of general practitioners, nurses, midwives, and, in some cases, physical therapists. Another innovation was the introduction of a care coordinator in each PHC Plus facility to support PHC Plus patients.

FIGURE 1: PHC Plus Pilot Model



The PHC Plus model was characterized by several distinctive features: (i) implementation was carried out in a comprehensive, planned, sustained and integrated manner; (ii) appointments in the clinic were initiated not only by the patient but also by the service provider and the patient was an active decision-making partner with the medical personnel based on an individual health care plan (IHCP); and (iii) it did not limit a patient's right to choose the PHC provider (but gave the right to choose how the care is organized). The patients that were targeted by PHC Plus included adults eligible for prevention programs, people with multiple chronic conditions and/or complex needs, and other vulnerable populations.

The health check-up program offered in the PHC Plus facilities involved health visits and a set of diagnostic tests aimed at stratifying the population into one of four groups: (i) healthy with no risk factors; (ii) healthy with no symptoms but some risk factors; (iii) chronic with no current symptoms and stable; and (iv) chronically ill with current symptoms and requiring stabilization. A fundamental goal of the health check-up visit was to identify patients' risk factors and refer them to receive health education visits aimed at strengthening their self-management skills and their engagement in their own treatment process. The health check-up program could be carried out in a basic or extended manner (depending on the scope of diagnostic tests to be carried out).

The program set up disease management programs (DMPs) for a range of chronic diseases and enrolled patients who qualified based on their health check-up or on the medical staff's knowledge of their health or medical records. DMPs covered eleven chronic diseases – primary hypertension, type 2 diabetes, chronic coronary artery disease, permanent atrial fibrillation, chronic heart failure, asthma, chronic obstructive pulmonary disease (COPD), parenchymal goiter and thyroid nodule, hypothyroidism, peripheral osteoarthritis, and back pain. Patients in each disease-specific program received care that was coordinated at their PHC facility as well as specialist consultations, physiotherapy, and health education. A diagnostic care pathway for each of the 11 chronic conditions determined which interventions were chosen, and patients in each DMP received all required services and support at the PHC level without the need for additional specialist care based on referrals.

Several enabling tools were included in the program to facilitate the provision of this care. The care coordinator in each facility managed the care pathway for each PHC Plus patient. These care coordinators could be either current PHC employees (administrative or medical) or a new staff member specially recruited for this purpose. The tasks of the coordinator included supporting primary care patients in their treatment process, ensuring better communication between PHC personnel and the patient, informing patients about the next stages of treatment (including treatment

beyond the PHC level of care), and organizing treatment, particularly for patients with chronic diseases.

The pilot was implemented between July 2018 and September 2021 and covered 47 PHC facilities. During the pilot program, three facilities dropped out but another five joined. All analyses carried out by the World Bank considered only those facilities that participated in the pilot program from its beginning, which amounted to 39 PHC facilities providing primary health care services to 71,000 patients. The total cost of the pilot was 60 million PLN, including PLN 15.3 million from the European Social Fund (coordination and IT grants) as of the end of June 2021.

The program provided additional budget funds to each PHC Plus facility to finance the provision of the new services. Also, the provision of the new purchasing model, such as bundled payments (including fee for service) were introduced for the selected services within the PHC pilot.

International experience has shown that bundled payments can align incentives for all providers and encourage them to work together to improve the quality of care, increase the coordination of care, and reduce costs, for example by preventing avoidable medical complications. Having one budget for multiple providers can motivate health-care providers to increase efficiency by cooperating on the services provided. The next step in a bundled payment system may be to move to value-based healthcare in which payments to each provider are conditional on improvements in the health of its patients. See Box 1 for how these systems have worked in other countries.

Box 1: International Examples of Bundled Payments

There are several examples of bundled payment schemes for chronic conditions from the EU countries and United States. Portugal piloted bundle payments in 2007 for selected high-cost chronic conditions (such as HIV/AIDS and multiple sclerosis). The Netherlands established in 2004 a bundle payment for patients with type 2 diabetes, COPD, and vascular risk management, where “care groups” are contracting partners for insurers for the provision of predefined activities within a year. Other initiatives include the pilot of the PROMETHEUS model covering episodes-of-care and chronic conditions and the Integrated Healthcare Association for orthopedic surgery. England developed best practice tariffs and more recently introduced a bundled payment for maternity care. Sweden launched a nationwide collaboration to develop bundled payments focusing on eight areas covering both episodes of care (such as hip replacements and spinal surgery) and chronic conditions (such as diabetes). These innovations have shown promise in the case of some conditions and episodes. For example, for acute conditions, there have been reductions in hospital readmission rates and complications and improvements in mortality for hip and knee replacement and bypass surgery in the United States, England, and Sweden. In the case of chronic conditions, staff performance and patient satisfaction improved in the Netherlands, and there was more adherence to medication and treatment protocols in Portugal (OECD 2016).

3. METHODOLOGY AND DATA COLLECTION

3.1 METHODOLOGY

Before the PHC Plus pilot program was implemented by the NHF, the World Bank team developed the general approach to be taken to its M&E. A “theory of change” approach was adopted, which involved determining the intended outcomes of the PHC Plus pilot and identifying the activities that the pilot was expected to conduct in order to achieve the desired outcomes and the contextual factors with the potential to affect the implementation of activities and the achievement of those outcomes.^{2,3} In accordance with this approach, the key evaluation questions and indicators were specified.⁴

The aims of the pilot were to improve the patients’ health and patients’ experience of care, and lower costs by reducing fragmentation, as the theory of change illustrates. Since the point of the integration introduced the PHC Plus pilot was to improve the delivery of care and patient experience, the evaluation focused on collecting information on: (i) improvements in health outcomes and (ii) improvements in patients’ experiences of care. Two other outcomes of interest that were evaluated were (iii) any reductions in the fragmentation of care and (iv) any decreases in costs. Whenever possible, the indicators were gathered at the start and the end of the pilot program and compared with each other (longitudinal measurement) and compared between the facilities that participated in the program and a control group of non-participating facilities (horizontal measurement).

Table 1 presents the main indicators that were developed to measure changes in the outcome variables.

2 Weiss (1995).

3 Vogel (2012)

4 The list of all reports written as part of the PHC Plus monitoring and evaluation process is presented at the end of the document. These reports were made available by the National Health Fund on the website: <https://akademia.nfz.gov.pl/?lang=en#>

TABLE 1: Outcomes and Associated Indicators

EXPECTED CHANGE FROM INTRODUCING INTEGRATED CARE IN THE PHC PLUS PILOT	INDICATORS
Improvements in health outcomes among participating patients	<ul style="list-style-type: none"> • Patient-reported health status • Number of health checkups provided, general • Number of health checkups provided, specific to type 2 diabetes, COPD/asthma, and lower back pain • Number of health care services provided, general • Number of health care services provided, specific to type 2 diabetes, COPD/asthma, and lower back pain • Frequency of chronic disease episodes (type 2 diabetes, COPD/asthma, and lower back pain) • Severity of chronic disease (type 2 diabetes, COPD/asthma, and lower back pain)
Improvements in health care experience among participating patients	<ul style="list-style-type: none"> • Patient-reported health care experiences • Number of health services provided in a coordinated package • Involvement of family members in the care process • Waiting times
Decrease in the fragmentation of care provided for chronic diseases among participating patients	<ul style="list-style-type: none"> • Number of patient visits to each care provider for the same disease • Number of patient visits to different providers for the same disease
Decrease in overall spending on health care in PCH Plus facilities	<ul style="list-style-type: none"> • Average cost of treating patients • Number and cost of laboratory tests • Number and cost of hospitalizations • Number and cost of prescriptions

3.1.1. MEASURING THE CONTINUUM OF CARE

Measuring the continuum or “cascade” of care is a useful way to quantify access to health services, their coverage and quality, and patients’ adherence to treatment throughout the sequential stages of care required to achieve a successful treatment outcome. It provides a useful lens through which to assess the delivery of chronic care and to identify and overcome any bottlenecks in the health system. The cascade of care involves four stages in a patient’s health care pathway: (i) screening, meaning whether the patient has been diagnosed with a health condition; (ii) diagnosis and treatment, meaning whether the patient is receiving appropriate health care; (iii) monitoring and maintenance, meaning whether the patient is adhering to the required care regimen; and (iv) outcome, meaning whether the patient’s disease is un-

der control. Since a failure at any stage of the cascade precludes success in the next stage, the evaluation measured each cascade step to identify any bottlenecks and solutions for overcoming them. Three care cascades were measured during the M&E of the PHC Plus pilot: (i) the health check-up cascade; (ii) the type 2 diabetes cascade; and (iii) the cardiology diseases cascade. For each cascade, the evaluation examined data on patients' enrollment in and use of the services related to each stage in the cascade and the care pathway related to that condition.⁵

3.1.2. MEASURING THE FRAGMENTATION OF CARE

The PHC Plus evaluation used a fragmentation of care index (FCI) to measure the dispersion of patient care based on the number of different providers visited by each patient and the number of visits made by each patient to each provider. It measured the extent to which care fragmentation had reduced for patients with selected chronic conditions after they entered a DMP. For statistical analysis, the analysis covered patients who had received services related to their condition both before and after the launch of the program. In the quasi-experimental approach, the data points before and after the launch of the program were compared, with the cut-off point being the date of the patients' enrollment in the DMP. The period that was analyzed was from January 2016 to December 2020. The analysis was based on patient activity tracking in the PHC Plus facilities and in outpatient specialized care (OSC). Sensitivity analysis was applied to ensure the robustness of the findings.⁶

3.1.3. ECONOMIC EFFICIENCY AND COST-BENEFIT ANALYSES

Economic efficiency and cost-benefit analyses of the PHC Plus pilot were conducted using three different methodologies:

(i) Measurement of the causal effect of participating in the PHC Plus pilot. The causal or treatment effect of participating in the PHC pilot was estimated using a panel regression model with each efficiency criterion as the outcome variable.⁷

(ii) Analysis of two patient cohorts. Cohort 1 consisted of patients enrolled in the PHC Plus DMPs in 36 participating facilities and who were observed during the 12 months before and during the 12 months after joining the program. The criterion for a patient

5 The detailed methodology used in the care cascade analysis is available for one disease management program (type 2 diabetes) and is presented in report No. 3.2.5.

6 The detailed methodology used in the care fragmentation index is available for two disease management programs (type 2 diabetes and asthma/COPD) and presented in reports No. 3.2.5 and 3.2.10).

7 For further details, please see report No. 3.2.12.

to qualify to join the cohort was the date on which they signed the consent form to enter the program with a cut-off date of December 31, 2018 (to exclude the confounding factor related to the COVID-19 pandemic). Cohort 2 consisted of patients enrolled in the PHC Plus DMPs in 38 participating facilities and who were observed during the six months before and six months after joining the DMP. The criterion for a patient to qualify to join the cohort was the date on which they signed the consent form to enter the program with a cut-off date of June 30, 2019. Cohort 2 may have included patients from Cohort 1. The provision of health care services at all levels of care and the use of pharmaceuticals by patients in both cohorts were monitored. Due to the length of the observation time, the size of the cohorts, and the number of services provided, the analysis of the observations focuses mainly on Cohort 1, in other words, patients who participated in the DMP for at least 12 months.

(iii) Cost-utility analysis (CUA). CUA is an economic analysis in which the incremental cost of a program from a particular point of view is compared to the incremental health improvement expressed in QALYs, which are a measure of the value of health outcomes in terms of one year of life in full health. The QALY calculation was derived from answers to the EQ-5D-5L questionnaire (designed to measure health-related quality of life) filled out by selected chronically ill patients from participating PHC Plus facilities. The patients filled out the questionnaires at the beginning and end of the pilot program (1st and 2nd round).⁸ For the first round of QALY results, the average cost of treatment was determined based on historical data on patients from the NHF. The average cost of treatment for the second round of QALY results was determined based on the average cost of patients' treatments under the PHC Plus pilot program. The cost-utility ratio was calculated in two ways, with the first based on the total cost of the services provided to a patient and the second based on the costs related only to a particular disease (such as type 2 diabetes, asthma, COPD, or back pain).

3.2 DATA COLLECTION

The data used to evaluate the PHC Plus pilot program came from NHF databases as well as from facility, provider, and patient surveys. NHF databases were the source of data on all of the participating primary care providers during the implementation period between July 2018 and June 2021. Surveys were used to gather data on the other metrics that were used to quantify integrated care measurements from the patients' perspective: patient-reported outcomes measures (PROM), patient-reported experience measures (PREM), and a health literacy measures (HL). Satisfaction

surveys were also carried out among facility staff, and initial (ex-ante) and final (ex-post) assessments were conducted of the participating facilities' readiness to implement the pilot program. All data was properly anonymized.

3.2.1 NHF DATABASES

The NHF data came from two databases: (i) the System for Handling the Process of Coordinated Patient Care (AP-PKUS) database and (ii) the Costs of Patient Treatment (KLP) database. The AP-PKUS database provided data on the number of signed patient consent forms (in other words, those who had signed a consent form to participate in the PHC Plus pilot program), on the number of health check-ups conducted, and on the DMPs. The KLP database provided data on all publicly funded health services and reimbursed prescriptions that were offered to the beneficiaries of the pilot.

The NHF provided anonymized data from the two databases in the form of delimited comma-separated values (csv) text files. These data covered the period of the pilot's implementation from July 2018 to June 2021, plus, in the case of the KLP database, five years of historical data. When the databases were combined, any IDs in the KLP data that were not repeated in the AP-PKUS database were excluded from the analysis. The World Bank team did not have any influence over the content or quality of the NHF data nor their timely delivery.

The analyses conducted using these databases were mainly aimed at detecting the quantitative implementation of the pilot at certain periods of time, mostly in terms of the number, cost, and types of services provided by the PHC Plus facilities.⁹

3.2.2 SURVEY DATA

Data on patient-reported outcomes measures (PROM), patient-reported experience measures (PREM), and health literacy measures (HL) collected through surveys were carried out by an external company, which was selected by the NHF in 2019 in an open-bid competition. The company used a combination of paper and pencil interviews (PAPI), computer-assisted web interviews (CAWI), computer-assisted personal interviews (CAPI), and computer-assisted telephone interviews (CATI). The first round of the survey was carried out from November 2019 to April 2020, and the sec-

9 The detailed methodology and periodic quantitative results of the pilot are presented in reports No. 3.2.1, 3.2.2, 3.2.3, 3.2.4, and 3.2.7 as well as on the Microsoft Power BI dashboards, which are available on the NHF's website dedicated to the pilot.

ond round was carried out one year later from November 2020 to April 2021. The responses were completely anonymous.

The surveys were carried out in both PHC Plus and PHC control facilities. The number of PHC Plus patients required to participate in the questionnaires was statistically matched and randomly distributed among all facilities. It was originally assumed that a total of 2,000 patients from PHC Plus facilities and 2,000 patients from control facilities would take part in the survey. These included 500 people suffering from back pain syndrome, 500 people suffering from type 2 diabetes, 500 people suffering from asthma/COPD, and 500 people who did not suffer from any of these chronic conditions. However, during the first round of the survey, three specific challenges were encountered in the selection of patients: (i) there were not enough patients in PHC Plus facilities who suffered from asthma/COPD (fewer than 500 patients); (ii) there were not enough men in certain age groups with a specific disease in the selected PHC Plus facilities; and (iii) the first case of COVID-19 was detected in Poland. This led to a reduction in the sample size. A total of 2,649 patients were surveyed in both rounds of the study, consisting of 1,588 PHC Plus patients from 37 PHC Plus facilities and 1,061 patients from the PHC control group from 54 PHC control facilities. The response rate in the second round of the study was greater than 80 percent.

The questionnaires used in PROM, PREM and HL surveys had been previously tested elsewhere in the world, and the language and cultural content were adapted to fit the Polish context¹⁰. The survey study and the questionnaires were approved by the Bioethics Committee.

The PROM data were completed by patients with type 2 diabetes, COPD/asthma, and lower back pain, and an additional clinical form was completed by personnel with authorized access to the patient's medical data within the facility. The PREM and HL data were completed by patients regardless of their disease status (and therefore also by patients who did not suffer from any of the diseases in question). In addition, the job satisfaction of PHC Plus facility personnel was measured using the Minnesota Satisfaction Questionnaire (MSQ).

The results of the questionnaires were calculated using a score value ranging from 0 to 100, and the difference in mean score values between the compared groups was analyzed.¹¹ A multivariate linear regression model was built for each of the score pa-

10 Questionnaires used to collect PROM data: Problem areas in diabetes (PAID), Numeric pain rating scale (NPRS), Oswestry disability index (ODI), Saint George's Respiratory Questionnaire (SGRQ), Health-related quality of life measure questionnaire (EQ-5D-5L); PREM data: Patient perception of integrated care (PPIC); HL data: Health literacy survey (HLS-EU-Q16).

11 In statistics, the score is the gradient of the log-likelihood function with respect to the parameter vector

rameters. The explanatory variables that were used were the type of PHC (PHC Plus facility or PHC control facility) and the patient's age, gender, education, and place of residence. In all of the analyses, a p-value of less than 0.05 was adopted as the level of significance. If the difference between the compared groups was statistically significant, the value of this difference was also checked for clinical significance, and minimum clinically important difference (MCID) values were determined for all score parameters. Using MCID makes it possible to determine the smallest change in a treatment outcome that a given patient would consider important and that would indicate the need for a change in patient management. All of the calculations were made using IBM SPSS Statistics v19.¹²

The World Bank staff gathered ex-ante and ex-post data from service providers participating in the PHC Plus program at the beginning and end of the pilot. The ex-ante surveys were carried out between September and October of 2018, and the ex-post surveys were carried out between May and June 2021. The studies were conducted in two parts, one aimed at facilities participating in the PHC Plus pilot program using the SurveyMonkey® online tool, and the other aimed at in-depth interviews with service providers participating in the PHC Plus pilot program in the form either of a direct meeting (for the ex-ante study) or an online interview (for the ex-post study). Because of the COVID-19 pandemic, direct meetings were abandoned for the ex-post study. The information obtained during the in-depth interviews supplemented and refined the information collected in the online survey.¹³

12 The detailed methodology used in the analysis based on these surveys is presented in reports No. 3.2.6 and 3.2.8.

13 The detailed methodology used in the analysis based on ex ante and ex post data is presented in reports No. 2.1. and 2.2.

4. RESULTS

4.1 INTRODUCTORY INFORMATION

The pilot had 71,000 participating patients, out of the approximately 280,000 patients that were signed on to the facilities implementing the PHC Plus pilot. As Table 2 shows, PHC Plus participants used more services than the national average in the first two years of the PHC Pilot program and more than they used before the implementation of the pilot.

TABLE 2: Annual Health Service Usage

SERVICE TYPE	2018		2019	
	POLAND AVERAGE	PHC PLUS PARTICIPANTS	POLAND AVERAGE	PHC PLUS PARTICIPANTS
Primary Care	4.07	4.32	4.18	4.40
Specialist Care	2.26	3.12	2.25	3.24
Hospitalization	0.27	0.41	0.28	0.46

Fifty-three thousand patients participated in the health prevention check-up program and 36,000 participated in at least one of the eleven DMPs that were available. Only 30 percent of all eligible patients of the PHC Plus facilities participated in health check-ups, while only between 20 and 30 percent of all eligible patients enrolled in the DMPs.¹⁴ Under the PHC Plus pilot program, the cost of a single basic health check-up visit amounted to PLN 180, while the extended health check-up cost PLN 231, making it the most expensive single service provided under the pilot program.

An integral part of the health check-ups provided as part of PHC Plus was the referral for a health education visit. Out of 53,000 people who had a health check-up, 32 percent received a subsequent educational visit, and 10 percent received a control educational visit, while only 6 percent had a third educational visit. The monitoring and evaluation of the PHC Plus pilot did not assess the clinical effectiveness of health check-ups.

14 Estimates based on available epidemiological data for Poland.

Most patients (60 percent of the total of 36,000) who enrolled in a DMP were recruited based on their medical records, while 52 percent and 47 percent respectively were recruited based on their health check-up and contact with their doctors. The total number of PHC Plus services provided to each patient per year was seven or eight without physiotherapy and around 14 including physiotherapy, while the total number of diagnostic tests provided to each patient was five to seven annually. The average patient participating in just one DMP used 15 services within the program annually, including 10 physiotherapy services, three diagnostic services, and two doctor's visits. The number of annual services delivered by the PHC Plus facilities to each patient in a DMP doubled compared to the year before they entered the pilot.

Since DMPs were not offered before the pilot program, it was necessary to compare the number of services provided by the facility before the program started with the number of services provided by the same facility to the same people with the addition of the PHC Plus pilot services. When physiotherapy services provided under PHC Plus were included in the analyses, the number of services provided was four times higher than in previous years.

The cohort of patients that participated in at least one DMP for 12 months received more services at all levels of care than the number of services that they received in the 12 months before the start of the program. The ratio of basic primary care services provided per patient ranged from 3.5 for parenchymal and nodular thyroid goiters (a decrease of about 19 percent compared to the year before the program) to 7.3 for COPD (a 14 percent increase). In specialist care, this ratio ranged from 1.6 among heart failure patients (a 53 percent increase) to 5.7 for patients with chronic coronary artery disease (a 1.4 percent decrease). In medical rehabilitation services, the ratio ranged from one service per patient with bronchial asthma (a 78 percent increase) to 9.2 for those with chronic heart failure (a 223 percent increase).

4.2 PATIENT HEALTH OUTCOMES

The evaluation of the PHC Plus pilot program sought to find out whether the program participants reported improvements in health outcomes. For this purpose, three questions were formulated as seen in Table 3.

TABLE 3: Health Outcomes Results of the PHC Plus Pilot Evaluation

M&E MAIN QUESTION: WERE THERE IMPROVEMENTS IN HEALTH OUTCOMES?		
1.	Were there improvements in the health outcomes of patients enrolled in the PHC Plus pilot according to patient-reported information?	YES
2.	Were there fewer exacerbations of chronic diseases in patients enrolled in the PHC Plus pilot?	NO
3.	Did PHC Plus patients and their families have more capacity for and certainty about their health management?	YES

Question 1 looked at improvements in health outcomes among patients enrolled in PHC Plus. The results of the PROM survey (including the SGRQ, PAID, ODI, and NPRS questionnaires) indicate that the chronic health care patients declared that their health was improved by the end of the pilot. Patients rated the severity of their disease on a scale from 0 to 100, and patients with type 2 diabetes rated their health as having improved by 4.37 points (20.60 vs 16.23), with the equivalent improvements declared by patients with asthma/COPD and those with back pain being 9.73 points (31.59 vs 21.86) and 10.14 points (28.83 vs 18.69) respectively. These changes were statistically ($p < 0.05$) and clinically (MCID) significant. Patients with back pain reported having significantly lower back pain intensity (by 0.5 points) on a scale of 0 to 10 at the end of the pilot study ($p < 0.05$).¹⁵

The analysis of the clinical form (filled in by the medical staff) additionally showed: (i) a 21 percent increase in the number of patients with asthma who had significantly better control of their disease according to the GINA scale ($p < 0.05$); (ii) a significant decrease in the number of disease-related complications reported by patients with asthma/COPD and type 2 diabetes ($p < 0.05$); (iii) a significant decline in the self-assessed ability of patients with back pain to manage their activities of daily living by 0.6 points on the ADL scale of 0 to 6 ($p < 0.05$); and (iv) no significant differences in the results of laboratory tests, including tests for glucose, cholesterol, triglycerides, erythrocyte sedimentation rate, and c-reactive protein, or in the results of spirometry and blood pressure measurements ($p > 0.05$).

¹⁵ The higher the PROM score, the greater the severity of the disease (in other words, the patient feels worse). If the difference was statistically significant ($p < 0.05$), then the clinical significance (MCID) was tested. The reference value for clinical significance for PROM was 4.14 for type 2 diabetes patients, 4.26 for asthma/COPD patients, and 3.33 for chronic back pain patients. This means that the score value was clinically valid if the difference in scores between groups was more than the MCID reference values. The detailed methodology used for the analysis based on the PAID, SGRQ, NPRS and ODI questionnaires and the results of the analysis are presented in report No. 3.2.8.

Question 2 sought to find out if there were fewer exacerbations of chronic diseases among patients enrolled in the PHC Plus pilot. For the purposes of the pilot, exacerbations of a chronic disease were defined as an increase in one-day visits to the hospital by PHC Plus patients. Excluding the COVID-19 time-period, the data showed that the number of one-day hospital admissions among PHC Plus chronic patients had actually increased by: (i) 65 percent among patients with permanent atrial fibrillation; (ii) 68 percent among patients with coronary heart disease; (iii) 8 percent among heart failure patients; (iv) 43 percent among patients with primary hypertension; (v) 56 percent among patients with peripheral osteoarthritis; (vi) 44 percent among patients with back pain; (vii) 125 percent among patients with hypothyroidism; (viii) 450 percent among parenchymal goiter and thyroid nodule patients; and (ix) 113 percent among patients with COPD. However, in patients with asthma, the number of one-day hospitalizations fell by 57 percent.¹⁶

Question 3 enquired whether PHC Plus patients and their families had more capacity for and confidence about their health management. WHO broadly defines health literacy as “the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health.”¹⁷ The results of the HL survey (HLS-EU-Q16 questionnaire) indicate that PHC Plus patients with chronic diseases reported having higher levels of health competency at the end of the pilot. These increases on a scale from 0 to 100 ranged from 3.05 percentage points for patients with type 2 diabetes (78.77 vs 80.66), to 2.29 points for patients with asthma/COPD (77.62 vs 79.91), and 1.01 points for patients with back pain syndrome (79.65 vs 80.66). These changes were statistically ($p < 0.05$) but not clinically (MCID) significant. We did not observe statistically significant changes in the HL results reported by patients with no chronic conditions.¹⁸

16 The detailed methodology and periodic quantitative results of the pilot are presented in reports No. 3.2.1, 3.2.2, 3.2.3, 3.2.4, and 3.2.7 as well as in the Microsoft Power BI dashboards that are available on the NHF website dedicated to the pilot.

17 WHO Europe (n/a).

18 The higher the HL score, the greater health literacy of patient (in other words, the more the patient knows about own health). If the difference was statistically significant ($p < 0.05$) then the clinical significance (MCID) was tested. The reference value for clinical significance for the HL was 3.42. This means that the score value was clinically valid if the difference in scores between groups was more than 3.42. Detailed methodology and results of the analysis based on HLS questionnaires are presented in report No. 3.2.8.

Box 2: International Examples of the Effect of Integrated Care on Patient Health Outcomes

Worldwide, despite the difficulty of measuring complex health outcomes, a systematic review of 67 studies published between 2006 and 2016 has shown that there have been significant improvements in health outcomes as a result of integrated care (Baxter et al, 2018). There is evidence to suggest that integrated care can improve health outcomes further than traditional care, especially in patients with complex needs and in the older population (Morciano et al, 2020; McKinsey and Company, 2015; and Yeoh et al, 2018). Studies in the UK and Italy found that integrated care programs focused both on diseases (heart failure and type 2 diabetes programs) and on elderly populations improved health outcomes, including hemoglobin A1C (HbA1C) levels, hospital admissions, and length of stay (McKinsey and Company, 2015; WHO, 2016; Hazarika and Purdy, 2015; and Liljas et al, 2019). Other studies have reported improvements of up to 33 percent on the pain/discomfort domain of the EQ-5D-5L questionnaire for patients receiving integrated care (John et al, 2020), while others reported no improvement (Lambeek et al, 2010 and Abbasi et al, 2021). Finally, integrated care proved to be more successful in reducing exacerbations of COPD than usual care, as shown by a multinational study in Spain and Belgium. In the latter study, among patients enrolled in integrated care for 12 months, the number who did not require a hospital re-admission increased by 18 percentage (Casas et al, 2006).

4.3 PATIENT EXPERIENCE OUTCOMES

The evaluation of the PHC Plus pilot program set out to answer a series of questions about patients' health experiences as summarized in Table 4.

TABLE 4: Patient Experience Outcomes from the PHC Plus Pilot

M&E MAIN QUESTION: HAD PATIENTS' SELF-DECLARED CARE EXPERIENCES IMPROVED?		
1.	Have patients with chronic conditions received a more coordinated package of health care services, according to patient-reported information?	NO
2.	Have family members been actively involved in the care process?	No reference data to compare
3.	Have waiting times for service delivery been reduced based on patient feedback about finding the system easier to navigate?	YES

Question 1 asked whether patients with chronic conditions self-reported receiving a more coordinated package of health care services because of the pilot. The results of the PREM survey (PPIC questionnaire) showed that, by the end of the pilot program, participating patients reported that there was less coordination of care. The decreases in the score values between the beginning and the end of the pilot were 6.37 points on a scale from 0 to 100 for patients with type 2 diabetes (34.70 vs 28.33), 6.13 points for patients with asthma/COPD (35.16 vs 29.03), and 5.64 points for patients with chronic back pain (33.38 vs 27.74) and 6.68 for the patients with no chronic conditions (28.35 vs 21.60). The questionnaire also examined patients' experience in six distinct aspects of care, but all the studied groups of PHC Plus patients reported improvements in only one of those aspects by the end of the pilot program – communication between primary care personnel and the patient about the results of their tests. Satisfaction with this communication increased by 6.55 points on a scale from 0 to 100 for patients with type 2 diabetes (53.33 vs 59.88), by 4.21 points for patients with asthma/COPD (56.11 vs 60.32), by 5.96 points for patients with back pain (54.30 vs 60.26), and by 4.70 points for patients with no chronic conditions (50.21 vs 54.91).¹⁹ These changes were statistically ($p < 0.05$) and clinically (MCID) significant.

Question 2 asked whether patients' family members had been actively involved in the care process because of the pilot program. None of the questionnaires used to evaluate the PHC Plus pilot program asked about the role played by the patients' families in coordinating their care. The NHF data did cover this issue but could not be made available because of the rules governing the protection of personal data. Instead, the evaluation conducted a detailed analysis of changes in patients' health literacy. Within the framework of health literacy, the family is analyzed as one of the main sources of health information.

Question 3 asked if waiting times for service delivery were reduced as a result of the pilot study. The evaluation found that PHC Plus patients were provided with faster access to diagnostic services and specialized consultations. In most cases, comprehensive care for chronically ill patients was initiated on the same day on which the patient consented to participate in the DMP. The reduction in waiting times was especially evident in the case of endocrine disorders.²⁰

19 The higher the PREM score, the more integrated the care was perceived to be by patients. If the difference was statistically significant ($p < 0.05$) then the MCID was tested. The reference value for clinical significance for PREM was 2.65. This means that the score value was clinically valid if the difference in scores between groups was more than 2.65. The detailed methodology and the results of the analysis carried out based on the PPIC questionnaire are presented in report No. 3.2.8.

20 The detailed methodology and periodic quantitative results of the pilot are presented in reports No. 3.2.1, 3.2.2, 3.2.3, 3.2.4, and 3.2.7 as well as on the Microsoft Power BI dashboards available on the NHF's website dedicated to the pilot.

Box 3: International Examples of the Effect of Integrated Care on Patient Experience Outcomes

Improving patients' experiences of receiving care has been one of the main motivations for implementing integrated care programs around the globe. While some international examples have shown that integrated care has improved the experiences of patients and their relatives when accessing health care services, in other cases, this remains a challenge. For instance, in the Netherlands, evaluators tested the perceived satisfaction of clients with the services provided by an integrated care program for frail elderly people over 75 (defined by a Groningen frailty indicator score of 4 or more). They found that patients' satisfaction levels with the services' client orientation, their knowledge of patients' care needs, and the extent to which the program included patients in joint decision-making about their health care was no different from their satisfaction levels with non-integrated care (Looman et al, 2004).

An assessment of a program providing integrated diabetes care in Australia found that patients did not perceive any improvements in waiting times or increases in patients being involved in their own treatment decisions. However, they did acknowledge receiving consistent advice and care from all health professionals as measured using the Problem Areas in Diabetes (PAID) and Patients' Evaluation of the Quality of Diabetes Care questionnaires (Browne et al, 2016). On the other hand, in focus groups of patients in integrated diabetes management programs, researchers from the UK and Switzerland reported that patients noted that their health care experiences were better (Beacon, 2015 and Carron et al, 2017).

4.4 CARE FRAGMENTATION

The evaluation of the PHC Plus pilot program examined whether there was less fragmentation in the management of care of chronic diseases among participating patients as summarized in Table 5.

TABLE 5: Care Delivery Outcomes from the PHC Plus Pilot Evaluation

M&E MAIN QUESTION: IS THERE LESS FRAGMENTATION IN CHRONIC DISEASE MANAGEMENT?		
1.	Are there more screening, prevention, and chronic care services?	YES
2.	Have IT tools been enhanced to foster the integration and coordination of care at the patient, provider, and payer levels?	NO
3.	Has fragmentation of care for chronic patients been reduced?	YES

Question 1 asked whether more screening, prevention, and chronic care services became available because of the pilot program. Although the data did not allow us to analyze any changes in screening and prevention before and after the pilot, we found that almost half of all DMP patients received health check-ups prior to entering the DMP program. The annual number of services received by PHC Plus patients

who signed up for a DMP was twice the average number that they had received before entering the program.²¹ In fact, compared to the national average, the average number of services per patient went up across all diseases.

Question 2 asked whether IT tools had been enhanced in the pilot program to foster the integration and coordination of care at the patient, provider, and payer levels. The evaluation, based on the ex-ante and ex-post Survey Monkey questionnaires, found that, at the end of the program, 89 percent of service providers had access to the software offered under the PHC Plus pilot compared with only 67 percent before the pilot. However, not all of the functionalities of this software had been made available to facilities by the end of the program. According to facility managers, the main barrier to the implementation of the pilot was an inadequately prepared IT system and other compounding problems such as delays in the delivery of the software, its incompatibility with the facilities' existing software, and its lack of user-friendliness. In in-depth interviews, the facility managers emphasized that the IT system should have been identical for all facilities and been delivered by one supplier on time for the start of the pilot program.²²

Question 3 asked whether fragmentation of care for chronically ill patients had been reduced as a result of the pilot program. The evaluation found that fragmentation of care for the entire PHC Plus cohort, including chronically ill patients, decreased from 0.4 to 0.24 because of the pilot program.²³ The fragmentation of care index was calculated using NHF data by tracking the services provided to patients in the PHC Plus facilities and in OSC and measuring the extent of change in care fragmentation for patients with selected chronic conditions before and after entering the pilot program.²⁴

21 The detailed methodology and periodic quantitative results of the pilot are presented in reports No. 3.2.1, 3.2.2, 3.2.3, 3.2.4, and 3.2.7 as well as in form of the Microsoft Power BI dashboards available on the NHF's website dedicated to the pilot.

22 The detailed methodology and results of the analysis carried out based on ex ante and ex post data are presented in reports No. 2.1. and 2.2.

23 FCI values range from 0 to 1, with higher scores indicating more fragmented care.

24 The detailed methodology and results of the care fragmentation index are available for two disease management programs (type 2 diabetes and asthma/COPD) and are presented in reports No. 3.2.5 and 3.2.10.

Box 4: International Examples of the Effect of Integrated Care on Care Fragmentation

A priority for integrated care programs is to reduce the fragmented delivery of their services at all levels of care. This was achieved in the Netherlands, where integrated care resulted in better follow up and coordination according to patients' responses to the Patients' Assessment of Chronic Illness Care questionnaires. However, the same study reported that patients did not notice any differences in the design, goal setting, or problem-solving aspects of the system (Kruis et al, 2014). Studies from the UK and the US that evaluated fragmentation of care using the continuity of care index, reported decreases in the fragmentation of care, while studies in Taiwan and the US reported opposite results (Liang, 2019 and Kern et al, 2020). These contrasting findings might be attributable to the voluntary enrollment used in the program in Taiwan and the cross-sectional design of the study from the United States; longitudinal and mandatory enrollment in integrated care programs tend to experience higher decreases in care fragmentation and better health outcomes. An evaluation of service use in an integrated care program for back pain in the Netherlands found that patients needed fewer healthcare consultations with medical specialists, fewer diagnostic tests, and fewer inpatient visits compared those using traditional care (Lambeek et al, 2010).

Another priority in the context of primary health care is to provide access to preventive services, for which there is consistent evidence that integrated care models produce positive results. For instance, in Taiwan, integrated care for patients with diabetes was associated with more screening for disease progression. This was done by examining patients' levels of HbA1c, low-density lipoprotein, urine microalbumin, and routine urinalysis tests, with the numbers of these screenings going up by 16 percent, 3 percent, 9 percent, and 5 percent respectively over a 12-month period (Chang et al, 2020). Meanwhile, in the US, the introduction of an integrated care program increased the number of men being screened for prostate cancer from 16.39 percent in 1998-2000 to 26.01 percent in 2004-2007 (Wallner et al, 2012).

Enhancements in IT have often been a key building block in facilitating the provision of care. In the US, the federal government has emphasized the critical role played by IT in health care and has created incentive programs to accelerate its application (Dixon et al, 2018). Also, in the Netherlands, the main element of an integrated care program for patients with multiple chronic conditions was an electronic "personal datastore," an IT platform in which medical and social care information from each patient was collected and shared with different providers to enable them to exchange health information and thus to coordinate the provision of care (Snoeijs et al, 2015).

4.5 FINANCIAL OUTCOMES

The evaluation of the PHC Plus pilot program examined whether the costs of care decreased as a result of the introduction of the program’s integrated care as summarized in Table 6.

TABLE 6: Financial Outcomes from the PHC Plus Pilot

M&E MAIN QUESTION: HAS THERE BEEN A REDUCTION IN THE COST OF CARE BECAUSE OF THE INTEGRATION OF CARE?		
1.	Has there been a reduction in duplicate laboratory testing?	No reference data to compare
2.	Has there been a reduction in duplicate prescriptions?	No reference data to compare
3.	Have there been fewer hospitalizations among chronic care patients enrolled in PHC Plus?	NO

Question 1 asked whether there had been a reduction in duplicate laboratory testing. The evaluation, based on an analysis of data on 71,000 PHC Plus patients, found that there was no significant change in the use of diagnostic tests (at either PHC Plus facilities or in OSC) after patients entered the pilot. A slight increase was recorded in the number of magnetic resonance imaging (MRI) and computed tomography (CT) scans among PHC Plus patients, while there was a 20 percent increase in the use of annual electrocardiogram (EKG) tests compared to the three years preceding the pilot. However, based on the available data, it is not possible to make any inferences on laboratory testing because of the lack of a clear definition of what constitutes duplication, including timeframes, the types of diagnostics required for specific care paths and for the traditional care process, and a lack of reported data about diagnostic tests at the PHC level.

Question 2 asked whether there had been any reduction in duplicate prescriptions. There was no significant change in the number and costs of prescriptions, but the available data did not make it possible to make any inferences about any changes in prescription duplication. However, fewer patients with neurological and rheumatological diseases used prescribed analgesics (reductions of 15 percent for back pain and 6 percent for peripheral osteoarthritis) and anti-inflammatory and anti-rheumatic medicines (reductions of 17 percent for back pain).

Question 3 asked whether there had been fewer hospitalizations among chronic care patients enrolled in PHC Plus. Among the entire population participating in PHC

Plus, the number of hospitalizations increased by about 12 percent in 2019 compared to previous years, with a greater increase in the number of one-day hospitalizations²⁵ (14 percent) than in the number of longer than one-day hospitalizations.²⁶ Patients' enrollment in the PHC Plus pilot program translated into a statistical rise of 0.004 in the monthly number of hospitalizations per patient.²⁷

Twenty-five percent of patients who received the health check-ups were hospitalized for a range of different reasons. The data provided by the NHF, which contained information about the number of health check-ups and the time taken to complete them but no clinical results, was not informative enough to make it possible to identify whether the health check-ups influenced the hospitalizations (there was no list of diseases that could be detected from the health check-up forms).

Among PHC Plus patients who had participated in a DMP for at least 12 months, the number of hospitalizations increased by 23 percent. The evaluation compared the number of hospitalizations of PHC Plus patients one year before and one year after they enrolled in the DMP (excluding the COVID-19 pandemic period) and found that, among PHC Plus patients with a specific health condition who had participated in the DMP for at least 12 months, the number of hospitalizations went up by: (i) 167 percent in the case of chronic coronary artery disease; (ii) 100 percent in the case of peripheral osteoarthritis; and (iii) 400 percent in the case of parenchymal goiters and thyroid nodules. However, the number of hospitalizations decreased among patients with: (i) primary hypertension by 34 percent; (ii) atrial fibrillation by 22 percent; (iii) asthma by 50 percent; and (iv) back pain by 50 percent. The number of hospitalizations did not change during this period for patients with: (i) type 2 diabetes; (ii) heart failure; (iii) COPD; and (iv) hypothyroidism.²⁸

4.5.1. IMPACT ON HEALTH CARE COSTS

The evaluation found that, in the pre-pandemic period (July 2018 to March 2020), a patient's enrollment in the PHC Plus pilot program resulted in a PLN 80.91 increase in the monthly cost of all health care services provided to that patient. During the pandemic period, however, monthly costs decreased by PLN 27.91. These estimates

25 One-day hospitalizations were defined as hospitalizations that started and ended on the same day.

26 More than one-day hospitalizations are defined as hospitalizations with different start and end dates, in other words, involving at least one night's stay in hospital.

27 Detailed changes of the unit costs of services calculated using different methodologies can be found in report No. 3.2.12.

28 The detailed methodology and periodic quantitative results of the pilot are presented in reports No. 3.2.1, 3.2.2, 3.2.3, 3.2.4, and 3.2.7 as well as in the Microsoft Power BI dashboards available online on the NHF's website dedicated to the pilot.

do not include the cost of pharmaceuticals or any grants received by the PHC Plus facility for IT development and the care coordinator’s salary.²⁹

In the pre-pandemic period, a patient’s entry into the pilot translated into a rise of PLN 54.11 in the monthly cost of PHC Plus services and OSC, with OSC accounting for PLN 4.24 of this amount. During the pandemic period, the monthly increase was PLN 29.92 lower. The impact of the PHC pilot on the monthly cost of OSC provided per patient rose by PLN 0.84 compared with the non-pandemic period. The monthly cost of hospital care for patients enrolled in the PHC Plus pilot rose by PLN 24.46, all other things being equal. During the pandemic period, the costs of hospital care provided to patients enrolled in the PHC Plus pilot decreased by PLN 3.04 compared to the pre-pandemic period, though the difference is not statistically significant.

In the pre-pandemic period, the monthly cost of reimbursements for pharmaceuticals to patients enrolled in the PHC Plus pilot rose by PLN 3.34. The highest annual average cost of services provided to PHC Plus patients enrolled in one DMP was in back pain (PLN 448.87), while the lowest cost was in the asthma management program (PLN 133.24).³⁰ The total cost of the health check-ups was PLN 19 million, which translates into an average per patient cost of around PLN 360.³¹

4.5.2. COST UTILITY RATIO

In this evaluation, changes in QALYs were measured in patients who had four chronic conditions (type 2 diabetes, asthma, COPD, and back pain). At the beginning of the pilot (measured by the first round of the EQ-5D-5L questionnaires), chronically ill PHC Plus patients had QALYs that were 17.4 days higher than those in the control group. At the end of the pilot (measured by the second round of the EQ-5D-5L questionnaires), PHC Plus patients had gained an additional 0.5 days, thus having a total of 17.9 days more than patients in the control group. Patients with type 2 diabetes particularly benefited from the pilot program, gaining an additional 2.1 days at the end of the pilot to reach a total of 21.7 days more than patients with type 2 diabetes in the control group. The differences were statistically significant.

29 The detailed methodology is presented in report No. 3.2.12.

30 These costs were calculated based on KLP data from the NHF database. The analysis includes the costs of OSC, hospital, rehabilitation, and PHC Plus care over one year for a cohort of patients participating in only one disease management program.

31 These costs were calculated based on KLP data from the NHF database. The analysis includes the costs of reimbursed services related to the health check-up program in the PHC Plus pilot over the span of the pilot from July 2018 to July 2021.

The cost-utility ratio was calculated in relation to one QALY (one year of life in full health). The result showed that, to gain one QALY through each DMP in the PHC Plus pilot, it was necessary to spend an additional PLN 269,402 per patient with type 2 diabetes (PLN 738 PLN per day), PLN 1,203,719 per patient with chronic back pain (PLN 3,298 PLN per day), PLN 31,772 per patient with COPD (PLN 87 per day), and PLN 50,652 per patient with asthma (144 PLN per day).

According to the relevant Ministry of Health regulation,³² the benchmark that should be used to estimate the cost of obtaining an additional QALY when replacing standard care with a new intervention is a value equivalent to three times the country's per capita GDP. In 2020, Poland's per capita GDP was PLN 61,055, which implies that the benchmark for estimating the cost of a new intervention to obtain an additional QALY would be PLN 183 165.³³ These numbers suggest that the cost-utility for PHC Plus is well above the recommended threshold for type 2 diabetes and back pain but not for COPD or asthma.

In all of the DMPs that were measured, the evaluation found that the higher the patients' PROMs score (patient feeling worse), the lower their chance of gaining one QALY. Regarding type 2 diabetes, residents of small towns had the greatest chance of acquiring an additional healthy year of life, while for back pain, those living in the countryside were most likely to benefit. It was also found that patients with asthma/COPD from medium-sized towns had lowest chance of gaining one QALY. However, these results must be treated with great caution as this relationship could also be influenced by other variables outside the scope of the study.

4.5.3. EFFICIENCY GAINS

There is some evidence that indicates that introducing integrated care can yield some efficiency gains. Although this was not the main assumption behind the pilot program, the evaluation was tasked with finding out if there were any indications that it had increased economic efficiency and led to a better use of available resources. According to Hazarika and Purdy (2015), "Integrated care could be an overarching strategy to encourage service change and redesign, rather than solely as a means of cost reduction. Indeed, evidence for the economic benefits of integrated care is equivocal, although many of its components have clear benefits for the quality of services received by patients. Given the financial challenge facing the United Kingdom NHS, integrated care may represent a useful methodology to encourage

32 The Journal of Laws 2012 r., pos. 388.
33 <https://data.worldbank.org/indicator/NY.GDP.PCAP.CN?locations=PL>

fundamental service redesign. This level of change is required if the health service is to adapt and survive in the face of significant fiscal challenges.”

There are some indications that medical teams working cooperatively with patients toward common goals has increased the efficiency of care in Poland. The estimation of the FCI index suggests that continuity of care increased as a result of the pilot program, which means that patients were being cared for by the same team throughout their care pathway.

Box 5: International Examples of the Effect of Integrated Care on Financial Outcomes

Internationally, several studies have observed a reduction in hospital admissions among patients enrolled in integrated care compared with those receiving traditional care (Timpel et al, 2020). For example, an evaluation of an Australian care program for patients with type 2 diabetes, COPD, and coronary artery disease found a 34 percent reduction in hospital admissions and a 32 percent reduction in ER visits for these patients two years after the program was launched (McKinsey and Company, 2015). On the other hand, international analyzes of integrated care programs have also shown that it can trigger an initial increase in hospitalizations, with a downward trend only emerging two to five years after the implementation of the care model reform (Morciano et al, 2020). Another Australian program, the SA HealthPlus, failed to reduce hospital admissions among patients from all of the participating facilities, and the expenses incurred in its implementation exceeded the cost of traditional forms of care as of two years after the program was launched (Battersby et al, 2007).

Integrated care can be expected to lead to a more efficient use of resources, such as medicines or laboratory tests. An analysis of an integrated care model in Italy found that physicians participating in this model were more likely to adhere to evidence-based clinical guidelines, which therefore increased the efficiency with which they used drug prescriptions and laboratory tests (Profili et al, 2017). Similarly, a population-based longitudinal study in Taiwan found that prescription duplication was reduced by up to 52.9 percent over eight years when patients received care from the same physician (high continuity of care index) and by up to 31.4 percent when the patient received care at the same facility (Cheng and Chen, 2014).

4.6. PREPAREDNESS OF PHC FACILITIES AND STAFF TO IMPLEMENT THE PILOT

By the end of the pilot, the organizational capacity of the facilities to implement the pilot had not changed much. Medical personnel reported that the main problem that they encountered was an inadequately prepared IT system, including delays in its delivery, its incompatibility with the facilities’ existing software, and its lack of user-friendliness. They also identified the insufficient promotion of the program, both to the patients and medical personnel, as a problem.

The heterogeneity of the PHC facilities enrolled in the pilot meant that some were better prepared to implement it than others. Smaller facilities (and those that were not a part of larger medical networks) encountered more technical and administrative difficulties in recruiting specific medical specialists. In larger establishments, there was often confusion about the reports that they were required to send to the program team. The service providers felt that these reports should be limited to information that is necessary for and used by the NHF.

One of the main aims of the program was to improve the coordination of care provided to chronic care patients by appointing one or more care coordinators in each facility participating in the program. The coordinator's main duties were to support the organization and implementation of care pathways across different levels of care, including ensuring the timeliness of health visits and the implementation of referred services, arranging educational, dietary, and psychological visits, and responding to any questions from the patient about their treatment, as well as other such responsibilities that their facility may determine. Patients responding to the ex-post survey perceived the care coordinator as the crucial component of care integration, because of which teamwork improved and the medical staff no longer needed to perform many administrative tasks. In view of the prevailing shortage of health care personnel in Poland, this was an especially important outcome.

Both at the beginning and at the end of the pilot, the role of the coordinator was most often performed by someone who was not a nurse (only in 35 percent of the providers) or a primary care physician (only 8 percent). At the end of the program, 57 percent of service providers reported that the function was carried out by an administrative employee. Half of the service providers employed two coordinators. All of the service providers expressed their willingness to maintain this function in the facility after the completion of the program.

In the ex-post evaluation, respondents for the PHC Plus facilities indicated that the pilot model had: (i) strengthened employee motivation, increased their competences, and introduced a new division of roles; (ii) increased the frequency of contacts between employees and enhanced collaboration among different medical professionals; (iii) streamlined workloads by organizing the work schedule of the entire team collectively; and (iv) fostered an atmosphere of innovation. However, the service providers also concluded that teamwork between PHC personnel and external specialist physicians (“outsiders”) needs to be improved. Over 50 percent of service providers were satisfied with the 20 different aspects of their work about which they were asked.

5. RECOMMENDATIONS FOR SCALING-UP THE PHC PLUS MODEL

There are several aspects of the PHC Plus integrated model of care that policy-makers may consider scaling up nationwide including: (i) appointing care coordinators in each PHC facility; (ii) targeting health prevention initiatives to specific groups of patients; (iii) introducing disease management programs; (iv) introducing bundled payments; and (v) improving IT systems for data management.

Because the organization of primary health care varies between regions in Poland and because PHC facilities differ in terms of their capacity, we recommend taking a modular approach to scaling up these elements. Facilities should be able to decide on the timing and scope of the introduction of care integration, but certain core elements should be obligatory, including a care coordinator, disease management programs (DMPs), bundled payment purchasing, and the adoption and use of IT to improve data management.

Table 7 presents our summary findings and recommendations for scaling up the PHC pilot³⁴.

34 The colors of the table correspond to the strength of the evidence (data quality) on which the recommendations are based. The darker the color, the greater the weight of the recommendation.

TABLE 7: Summary of Findings and Recommendations for Scaling Up the PHC Pilot

SUMMARY FINDINGS FROM THE PHC PLUS	NEXT STEPS PROPOSAL
During the three years of the pilot's implementation, about 25 percent of the population eligible for the PHC Plus pilot was enrolled in either the DMPs or the health check-ups.	Scaling up the PHC Plus integrated care model will take time. We recommend that scaling up the pilot nationwide should be done over several years, preferably three to six years. It is unlikely that all chronic care patients and all patients eligible for health check-ups will enroll.
More health care services were provided per patient as a result of the pilot program, mostly at the PHC level.	The increase partially came from the obligatory services provided as part of the pilot program. We recommend reducing the obligatory services to one DMP visit (and a follow-up depending on the specific care pathway) and a combination of some of the diagnostic tests needed for the chronic disease with the health check-ups (if implemented).
As a result of the pilot, hospitalization rates for some diseases increased. The number of patients using ambulatory specialist services (OSC) decreased, as did the number of OSC services provided.	We recommend that the DMPs should cover key diagnostic tests to enable chronic care management and to avoid patients being hospitalized simply for diagnostic purposes.
As a result of the pilot, there was less fragmentation of care.	We recommend appointing care coordinators in every PHC facility, ensuring that patients can access chronic care diagnostics at the appropriate level of care, strengthening teamwork by enhanced IT connectiveness and training, and introducing bundled payments.
As a result of the pilot, patients reported knowing more about their health and the care that they received.	We recommend appointing care coordinators in every PHC facility, implementing DMPs for patients with chronic conditions, and providing educational activities for the patients and their families. The people responsible for conducting this education should be equipped with educational and informational materials to facilitate these activities.

<p>As a result of the pilot, patients' experience of care integration was less positive.</p>	<p>We recommend measuring patients' experience of receiving care at the facility level, implementing continuous improvements to prevention and chronic care management, and providing medical teams with training in communication tools with patients.</p>
<p>As a result of the pilot, chronically ill patients felt healthier.</p>	<p>We recommend measuring population-based indicators both for the population covered at the facility and at the national level, introducing DMPs for patients with chronic diseases, and implementing continuous improvements to prevention and chronic care management at the facility level.</p>
<p>As the result of the pilot, the satisfaction of primary health care personnel did not change. Most of the employees were "satisfied" with all 20 aspects of their work.</p>	<p>We recommend introducing regular capacity-building and experience-sharing initiatives. to support PHC personnel, including medical teams.</p>
<p>As a result of the pilot, PHC facility managers reported significant organizational shortcomings.</p>	<p>Several building blocks of integrated care could be adopted voluntarily and gradually by each facility in accordance with its capacity and business model.</p>
<p>As a result of the pilot, PHC facility managers reported insufficient use of IT tools and no access to data beyond each provider.</p>	<p>More efforts need to be made to develop national-level e-health tools to allow for the sharing of medical records (already in progress with the ongoing development of the e-health platform P1) as well as integrated care guidelines and applications to be used at the facility level.</p>
<p>As a result of the pilot, PHC facility managers reported insufficient communication among the key health stakeholders involved in implementing the integrated care model.</p>	<p>We recommend that the NHF should organize open communication sessions between the key health stakeholders involved in implementing the integrated care models as well as introducing regular capacity-building and experience-sharing initiatives between health facilities and regular information and data-sharing platforms at the national and regional levels.</p>
<p>As a result of the pilot, PHC facility managers reported insufficient capacity-building of PHC Plus facilities and little knowledge exchange among them.</p>	<p>We recommend that the NHF should consider introducing regular capacity-building and experience-sharing initiatives for PHC facilities as well as regular information and data-sharing platforms at the national and regional levels.</p>

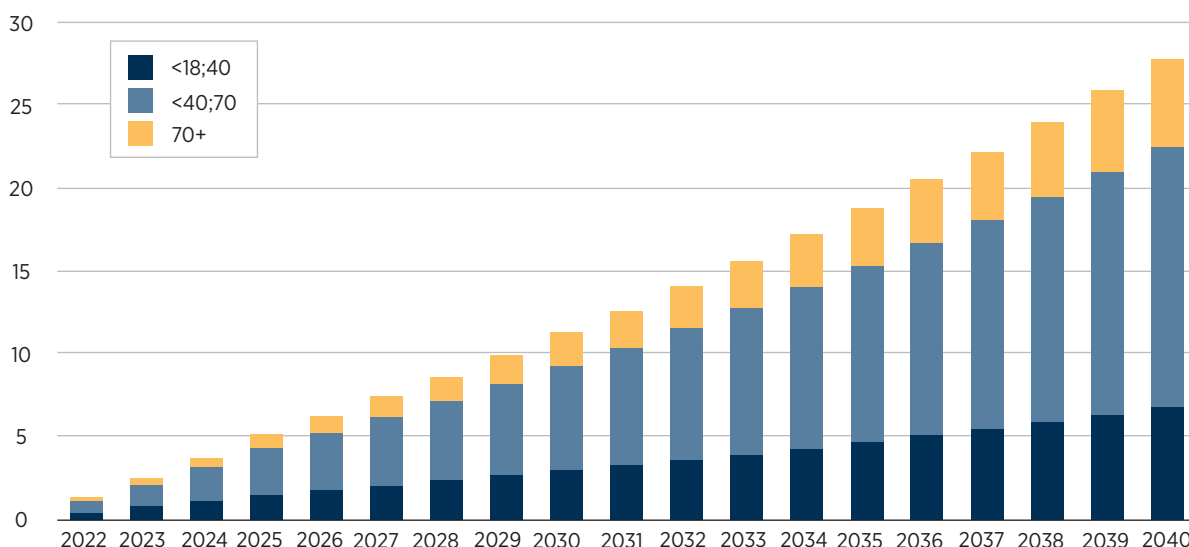
As a result of the pilot, PHC facility managers reported limited proactive population management by PHC Plus facilities.	We recommend that the NHF should consider introducing regular information and data-sharing platforms at the national and regional levels as well as developing population management tools to be used by the NHF and health facilities.
As a result of the pilot, PHC facility managers reported there was not enough teamwork within PHC Plus facilities.	We recommend continuing to emphasize from the top down the need for care coordination as well as introducing bundled payments, adopting IT tools that would support teamwork (such as data exchange applications), and measuring teamwork at the facility level.
In the pilot, the capacity of PHC facilities to implement new models of care and take on additional tasks varied considerably.	Several building blocks of the integrated care model could be implemented voluntarily and gradually by each facility in accordance with its capacity and business model.
The impact of the pilot interventions seemed to be greater in small and medium-sized facilities.	We recommend implementing further integrated care pilot programs tailored to small PHC facilities in rural areas to enhance their capacity.
The group of patients that may have benefited the most from the new model of care were patients with the worst self-assessments of their own health and who lived outside of big cities.	We recommend introducing targeted interventions such as DMPs and health education for the most appropriate groups of patients. All interventions should be developed in accordance with evidence-based medicine principles.

We have developed four different scenarios of the financial consequences of the scaling up process. We used different research methodologies to derive the assumptions made in the scenarios to ensure their comprehensiveness. All scenarios are based on population estimates from Poland's Central Statistical Office (GUS). Each scenario, unless otherwise indicated, assumes that the national integrated care program would have the same coverage of the adult population (25 percent) and the same age and gender distribution of the patients who participated in the PHC Plus pilot. The timeline of the scenarios is 2022 to 2040.

SCENARIO 1

Assuming 1 percent annual increase in prices, extending the PHC Plus pilot nationwide would cost PLN 5 billion by 2025 with 25 percent of the population covered by the program. In 2040, when, according to the assumptions of the projection, the PHC Plus program would be available to the entire adult patient population, the aggregated annual cost of PHC Plus services would amount to approximately PLN 28 billion. Moreover, the group of patients aged 70 and older would represent an increasing share of the pool of costs (an increase from approximately 13 percent in 2022 to approximately 19 percent in 2040). The annual costs of the scaled-up program are presented in Figure 2.

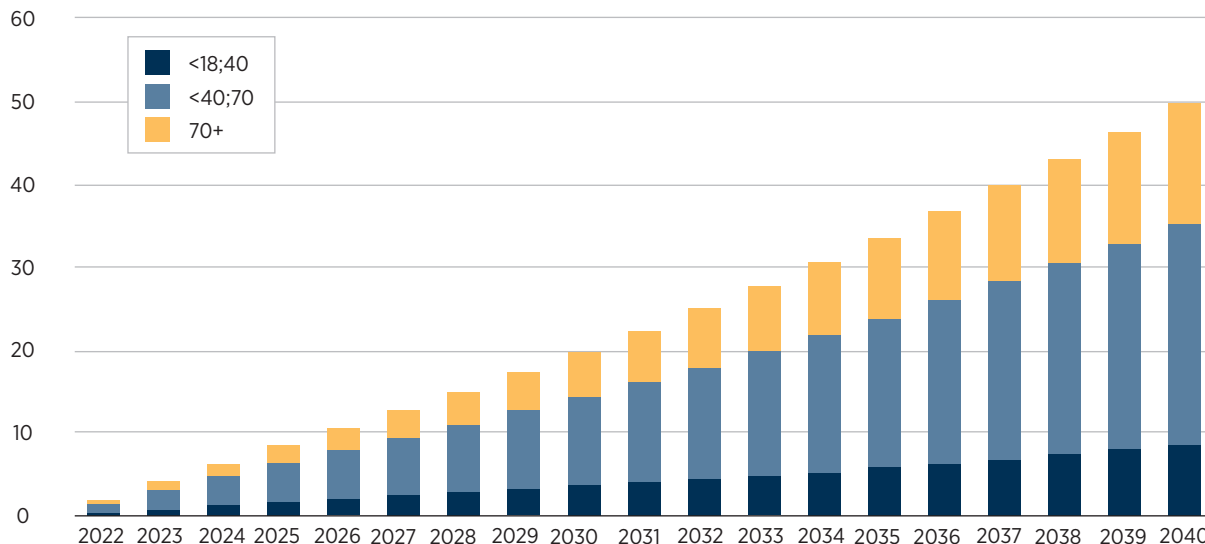
FIGURE 2: Total Annual Cost of Scaled-up PHC Plus Services by Age Group (PLN billion)



Source: World Bank estimates based on the estimates from report No. 3.2.12.

Assuming the gradual recruitment of patients into the national PHC Plus program and an annual 1 percent increase in prices, we estimate that the increase in NHF expenditures for ambulatory, hospital care, and PHC Plus financing (excluding the cost of pharmaceuticals, PHC capitation, and emergency units lump sums) would be PLN 19.8 billion in 2030 and PLN 49.6 billion in 2040 in order to be available to 100 percent of the population (see Figure 3).

FIGURE 3: Impact of Scaling Up the PHC Plus Model on Total Annual Cost of All Health Care Services by Age Groups (PLN billion)



Source: World Bank estimates based on the estimates from report No. 3.2.12.

SCENARIO 2

Scenario 2 assumes that the PHC Plus model is scaled up nationwide but only for chronically ill patients (in other words, those participating in DMPs). In this scenario, the scaling-up of the pilot would amount to approximately PLN 3.93 billion by 2025 (within three years of the start of the scale up). If, however, the DMP was to be made available only to those between 40 and 70 years old (which is the age group that consumes the most chronic care services), the total cost (given current prices) would be PLN 2.70 billion in 2025 (within three years of the start of the scale up). If 1.5 percent of the population had only one chronic disease, then the services provided for that one DMP would cost the system annually around PLN 177 million in 2025 (with a slight increase in the following years).

SCENARIO 3

Scenario 3 assumes that the PHC Plus model is scaled up nationwide but only to provide health check-ups. In this case, the scaling up of the pilot would cost approximately PLN 2.64 billion in 2025 (within three years of the start of the scale up).

SCENARIO 4

The group of patients that may have benefited the most from the new model of care were patients who had the worst self-assessments of their own health and did not live in the big cities. If PHC Plus services were to be made available only to people living in rural areas, the annual cost would be PLN 865 million. If PHC Plus services were to be made available only to people living in towns, the annual cost would be PLN 1.33 billion. However, if the program consisted of only DMPs and was implemented exclusively in rural areas or exclusively in towns, then the annual cost would amount to PLN 538 million or PLN 772 million respectively. Introducing the DMP program only for people over 60 living in rural areas would cost PLN 260 million annually, while introducing it for the same age group living in towns would cost PLN 344 million annually.

6. CONCLUSIONS

The evaluation of the PHC Plus pilot program has revealed that, at the end of the program, PHC Plus patients were in better health than before they joined the pilot and had greater health literacy. However, program they also reported having had worse care-seeking experiences than before the pilot, even though fragmentation of care was reduced for chronically ill patients. The evaluation found an increase in the use of most health services among PHC Plus participants, including hospitalizations. There was, however, a decrease in the use of specialist services.

The evaluation also found an increase in days of healthy life among PHC Plus patients at the end of the pilot. PHC Plus patients had higher QALYs than the control group from the very beginning of the pilot. Overall, the evaluation concludes that the new service delivery model, which is organized around the needs of patients, enable patients to play an active role in their own care, and provides modern prevention education and pro-active and high-quality disease management, has yielded tangible benefits and has been welcomed by both patients and medical personnel.

The evaluation has also highlighted the additional effort that effective implementation of the new service delivery model will require, particularly in terms of building the capacity of PHC, MoH and NHF teams and of ensuring adequate financing. As a result, the evaluation recommends that integrated care should be scaled up nationwide throughout Poland using a module approach, preferably voluntary, that would make it possible to adjust each building block in accordance with patients' needs, the capacity of health workers, and the availability of tools and budgets. RAND Europe, a think-tank, came to this conclusion in 2012, noting that the “concept of integrated care is fluid and highlights the fact that a broad range of initiatives are brought under its umbrella. This only serves to compound a number of issues, including that of assessing the added value of integrated care generally and its potential benefits for both patients and professionals, as well as the potential cost savings it can engender.”

The PHC Plus pilot resulted in an additional PLN 81 per month per patient to provide all levels of care. The annual cost of caring for a chronically ill patient enrolled in a DMP increased by 56 percent compared to the year before the pilot. The overall costs of providing integrated care are likely to grow over time as the population ages and more elderly need chronic care. In 2022, there will be 4.82 million people aged

over 70 in Poland, and this population will grow to 6.28 million by 2030. Even if the average number of services delivered per patient per year remains the same as in the PHC Plus pilot (11), this will increase the total number of services to be delivered and financed by 30 percent. Managing these costs will require putting more emphasis on well-established prevention interventions that have been scientifically proven to be efficacious, targeted to precise groups and supported by patient stratification models.³⁵ It will also require the implementation of stronger and more effective DMPs for selected groups of patients and diseases, especially chronic diseases with the highest incidence rates that are capable of being treated at the primary health care level (such as asthma and diabetes). Finally, the evaluation recommends that costs could be better controlled by: (i) introducing a national-level effort to build the capacity of health teams working in the PHC facilities and (ii) revising the medical curriculum to include the teamwork approach, patient stratification models, population-based management, the use of IT tools, the development of telemedicine protocols, and the implementation of clinical pathways. Policymakers should consider implementing additional, smaller-scale pilot programs, especially in rural areas to enable more PHC facilities to prepare and test integrated care solutions tailored to their needs and populations.

While these findings and conclusions can be considered robust, it should be borne in mind that the evaluation exercise suffered from several limitations. The quality of the KLP and AP-PKUŚ data on health service use was variable, and a lot of information about service use and costs was missing from the datasets, including data on PHC services, PHC financing, and emergency care financing. Nor was there any possibility of acquiring data on private health care provision or on over-the-counter medications used by the participating patients. Another obstacle was the quality of data reported by the providers, resulting in questionable ICD10 codes assigned to services (for example, Z-codes).³⁶ Also, because of GDPR regulations, limited data were available on the control group as there was no way to acquire their consent to access their service use data. Lastly, the COVID-19 pandemic put a big strain on the reliability of the data from March 2020 until the end of the pilot.

Furthermore, the fact that patients could sign up for PHC Plus at any time, while useful for implementation, made it difficult to develop a robust and consistent methodology for the evaluation. Thus, the observation period was short for some patients,

35 Patient stratification can be used to find those individuals at risk of an adverse event (for example, hospitalization) whose risk might be mitigated by being offered a proactive intervention. It can also be used in population health planning to understand the distribution and health needs and experiences of different cohorts of patients.

36 The Z codes (Z00-Z99) provide descriptions for when the symptoms a patient displays do not point to a specific disorder but still warrant treatment

and the evaluation had to be restricted to patients who had been in a DMP for at least 12 months.

Finally, it should be emphasized that the evaluation did not use the randomized controlled trial structure, which is commonly considered the most valuable method of assessing the effectiveness of an intervention. In 2017, the NHF announced the recruitment of PHC service providers for the PHC Plus pilot. For legal reasons, it was not possible to choose the providers randomly. Instead, the NHF defined the selection criteria, the pre-selection regulations, and the conditions that the service providers had to meet. Over 800 service providers applied to be included, but by the end of the pilot, the NHF had chosen only 47 institutions to implement the PHC Plus program.

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ANNEX 1 SUMMARY OF QUANTITATIVE INDICATORS

Annex Table 1.1 compares the number of services received by patients enrolled in just one of the PHC Plus program’s 11 disease management programs (DMPs) one year into the program with the number and costs of the services that they received in the year before they entered PHC Plus. To ensure that the analyzed services were related to the disease covered by the DMP, we ensured that the services received by each group were matched with the appropriate ICD10 code for that disease.

ANNEX TABLE 1.1: Change in the Number of Services Received by Patients After Entering the PHC Plus Disease Management Program

DMP GROUP	PHC (NOT PHC PLUS)	AOS	HOSPITAL	REHABILITATION
All ICD10/all DMPs	-20%	-0.3%	23%	
Type 2 diabetes	-29%	-29%	0%	
Primary hypertension	-46%	-40%	-34%	
Chronic coronary artery disease	-34%	-28%	167%	
Chronic heart failure	-21%	50%	0%	
Permanent atrial fibrillation	-30%	-65%	-22%	
Asthma	4%	17%	-50%	
Chronic obstructive pulmonary disease (COPD)	114%	-18%	0%	
Hypothyroidism	-11%	-42%	0%	
Parenchymal goiter and thyroid nodule	46%	-49%	400%	
Peripheral osteoarthritis	28%	47%	100%	-26%
Back pain	22%	-10%	-50%	-10%

Note: No differentiation to the ICD10 diagnosis.

Annex Table 1.2 below indicates that the main services used by patients in all of the groups were PHC doctor consultations, specialist consultations, complex visits, control visits, and education visits to PHC Plus facilities, and some of the PHC Plus diagnostic tests depending on the disease.

ANNEX TABLE 1.2: Top 10 Services Received by Disease Management Program Patients (1 year observation)

TYPE 2 DIABETES	
PHC Consultations	21%
Control visits PHC Plus	11%
Complex visit PHC Plus	9%
PHC Plus specialist consultation (diabetologist-patient)	7%
Initial visit PHC Plus	4%
Education visit PHC Plus (second)	3%
HBA1C (PHC Plus)	3%
OSC Specialist visit	3%
Education visit PHC Plus (first)	3%
DMP man-month (PHC Plus)	2%
PRIMARY HYPERTENSION	
PHC Consultations	31%
Control visit PHC Plus	15%
Complex visit PHC Plus	9%
PHC Plus specialist consultation (cardiologist-patient)	4%
EKG-12 (PHC Plus)	3%
Education visit PHC Plus (second)	3%
Education visit PHC Plus (first)	2%
OSC specialist visit	2%
TTE (transthoracic ECHO) (PHC Plus)	2%
Initial visit PHC Plus	1%
CHRONIC CORONARY ARTERY DISEASE	
PHC Consultations	18%
PHC Plus specialist consultation (cardiologist-patient)	9%
Control visit PHC Plus	7%
OSC Specialist visit	6%
EKG-12 (PHC Plus)	6%
Complex visit PHC Plus	5%
TTE (transthoracic ECHO) (PHC+)	4%
Cholesterol (PHC Plus)	2%
Cholesterol LDL (PHC Plus)	2%
Triglyceride (TG) (PHC Plus)	2%

CHRONIC HEART FAILURE	
PHC Consultations	30%
Nurse visit	11%
Nursing services (man-day)	10%
Control visit PHC Plus	6%
Complex visit PHC Plus	4%
PHC Plus specialist consultation (cardiologist-patient)	3%
Education visit PHC Plus (first)	2%
OSC Specialist visit	1%
OSC Specialist visit	1%
EKG - 12	1%
PERMANENT ATRIAL FIBRILLATION	
PHC Consultations	13%
PHC Plus specialist consultation (cardiologist-patient)	9%
Complex visit PHC Plus	6%
Control visit PHC Plus	5%
HOLTER EKG 24 (PHC Plus)	4%
EKG-12 (PHC Plus)	4%
Control visit PHC Plus STATYSTYCZNA	3%
TTE (transthoracic ECHO) (PHC Plus)	3%
OSC Specialist visit	3%
OSC Specialist visit	2%
ASTHMA	
PHC Consultations	20%
Complex visit PHC Plus	9%
Complex PHC Plus health check-up	7%
PHC Plus specialist consultation (pulmonologist-patient)	6%
Control visit PHC Plus	4%
Complex PHC Plus health check-up	3%
Complex PHC Plus health check-up	3%
Initial visit PHC Plus	3%
Complex PHC Plus health check-up	3%
Complex PHC Plus health check-up	2%
CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)	
PHC Consultations	12%
Complex visit PHC Plus	10%
Control visit PHC Plus	7%
Initial visit PHC Plus	7%
PHC Plus specialist consultation (pulmonologist-patient)	7%
Complex PHC Plus health check-up	6%

CHEST X-RAY (PHC Plus)	6%
Spirometry (PHC Plus)	6%
OSC Specialist visit	4%
OSC Specialist visit	4%
HYPOTHYROIDISM	
PHC Consultations	23%
Control visit PHC Plus	12%
Complex visit PHC Plus	10%
PHC Plus specialist consultation (endocrinologist-patient)	8%
TSH (PHC Plus)	3%
Initial visit PHC Plus	3%
ATPO (PHC Plus)	3%
FT4 (PHC Plus)	2%
Complex PHC Plus health check-up	2%
Thyroid ultrasound (PHC Plus)	2%
PARENCHYMAL GOITER AND THYROID NODULE	
PHC Plus specialist consultation (endocrinologist-patient)	10%
Complex visit PHC Plus	10%
Control visit PHC Plus	8%
PHC Consultations	7%
Complex PHC Plus health check-up	4%
THYROID FINE-NEEDLE ASPIRATION BIOPSY (PHC Plus)	3%
TSH (PHC Plus)	3%
FT4 (PHC Plus)	3%
Control visit PHC Plus STATYSTYCZNA	3%
FT3 (PHC Plus)	3%
PERIPHERAL OSTEOARTHRITIS	
Laser therapy (PHC Plus)	10%
Ultrasound (PHC Plus)	9%
Individual work with patient (PHC Plus)	7%
Magnetic field	5%
PHC Consultations	5%
TENS	3%
Assisted exercise 15 min (PHC Plus)	3%
Massage dry 15 min (PHC Plus)	3%
TENS (PHC)	3%
Di adynamic currents (PHC Plus)	3%
ZESPOŁY BÓLOWE KRĘGOSŁUPA	
Individual work with patient (PHC Plus)	10%
Massage dry 15 min (PHC Plus)	7%

Laser therapy (PHC Plus)	7%
TENS (PHC Plus)	6%
Ultrasounds (PHC Plus)	5%
Irradiation (PHC Plus)	5%
Interfering current (PHC Plus)	4%
PHC Consultations	4%
Exercises (PHC Plus)	3%
Assisted exercises (PHC Plus)	2%

Annex Table 1.3 presents the costs of services and specific products in the DMP groups that relate to specific ICD10 codes.

ANNEX TABLE 1.3: Cost of Services Provided in Outpatient Specialist Care, Hospitals, Rehabilitation, and PHC Plus (in zł)

DMP GROUP	ANNUAL COST OF CARE	OUTPATIENT SPECIALIST CARE	HOSPITAL CARE	REHABILITATION	PHC+
ALL ICD10/all DMPs	Cost of care during PHC Plus	3.290.048	12.984.152	1.304.760	3.912.746
	Cost of care per patient during PHC Plus	400	1580	159	476
	Change before/during PHC Plus	7.4%	39.1%	9.3%	100.0%
Type 2 diabetes	Cost of care during PHC Plus	1.398			28.580
	Cost of care per patient during PHC Plus	7.70			157.03
	Change before/during PHC Plus	-28.8%			100%
Primary hypertension	Cost of care during PHC Plus	22.873	8.817		391.628
	Cost of care per patient during PHC Plus	14.38	5.55		246.30
	Change before/during PHC Plus	-40.0%	29.4%		100.0%
Chronic coronary artery disease	Cost of care during PHC Plus	2.555	39.324		21.902
	Cost of care per patient during PHC Plus	33.62	517.42		288.19
	Change before/during PHC Plus	-36.4%	163.3%		100.0%
Chronic heart failure	Cost of care during PHC Plus	183	5.813		1.924
	Cost of care per patient during PHC Plus	13.10	415.21		137.43
	Change before/during PHC Plus	75.7%	68.3%		100.0%

DMP GROUP	ANNUAL COST OF CARE	OUTPATIENT SPECIALIST CARE	HOSPITAL CARE	REHABILITATION	PHC+
Permanent atrial fibrillation	Cost of care during PHC Plus	667	36.612		14.458
	Cost of care per patient during PHC Plus	14.20	778.99		307.62
	Change before/during PHC Plus	-60.7%	90.6%		100.0%
Asthma	Cost of care during PHC Plus	3.305	0		9.327
	Cost of care per patient during PHC Plus	47.22	0.00		133.24
	Change before/during PHC Plus	2.7%	-100.0%*		100.0%
Chronic obstructive pulmonary disease (COPD)	Cost of care during PHC Plus	817		2.380	5.180
	Cost of care per patient during PHC Plus	21.51		62.63	136.33
	Change before/during PHC Plus	-39.8%		100.0%	100.0%
Hypothyroidism	Cost of care during PHC Plus	4.068	2.087		100.512
	Cost of care per patient during PHC Plus	8.18	4.20		202.24
	Change before/during PHC Plus	-41.5%	10.3%		100.0%
Parenchymal goiter and thyroid nodule	Cost of care during PHC Plus	2.028	21.683		68.437
	Cost of care per patient during PHC Plus	7.71	82.45		260.22
	Change before/during PHC Plus	-48%	449%		100%
Peripheral osteoarthritis	Cost of care during PHC Plus	1.830	2.1701	8.060	28.561
	Cost of care per patient during PHC Plus	13.07	155.01	57.57	204.01
	Change before/during PHC Plus	72%	34%	107%	100%
Back pain	Cost of care during PHC Plus	11.728	27.299	30.557	257.204
	Cost of care per patient during PHC Plus	20.50	47.64	53.33	448.87
	Change before/during PHC Plus	-18%	-63%	-6%	100%

Notes: Annual cost per patient of one year of participation in one DMP program and percentage change in costs compared to one year before enrolling in the DMP. *Decreased to zero from 2598.96 zł before the program.

Annex Table 1.4 presents the costs of reimbursed purchased medicines for each DMP group, as well as the number of medicines purchased. To measure the effect of DMP care on medicine use, we used WHO's Anatomical Therapeutic Chemical (ATC) codes (a unique code assigned to each medicine according to the organ or system on which it works and how it works) to pinpoint the types of drugs whose use can

be affected by the comprehensive care provided in the pilot. The cost of medicine is presented in the data in three ways: (i) as the overall cost of the medicine; (ii) as the cost of the NHF reimbursement; and (iii) as the out-of-pocket cost for the patient. The number of drugs used increased during the PHC Plus pilot in all DMP groups except heart failure where the number of drugs used decreased.

ANNEX TABLE 1.4: Purchased and Reimbursed Medicine Costs for Each DMP Group

DMP GROUP	AT CODE	CHANGE IN THE NUMBER OF PATIENTS USING THE MEDICINE	CHANGE IN THE COST OF THE MEDICINE	CHANGE IN THE NUMBER OF DRUGS PER PATIENT	CHANGE IN UNIT COSTS OF THE MEDICINE
Type 2 diabetes	A10	24.8%	37%	10.4%	-0.5%
Primary hypertension	C02	20.5%	43.7%	27.8%	-6.7%
Chronic coronary artery disease	C	16.1%	16.7%	3.9%	-3.3%
Chronic heart failure	C	0	-9%	-41.9%	56.7%
Permanent atrial fibrillation	C	17.9%	24.6%	5.9%	-0.2%
Asthma	R	34.1%	48.7%	8%	2.6%
Chronic Obstructive Pulmonary Disease (COPD)	R	60%	39.5%	-17.6%	5.7%
Hypothyroidism	H03	20.9%	58%	37.8%	-5.1%
Parenchymal goiter and thyroid nodule	H03	350%	391.6%	11.1%	-1.7%
Peripheral osteoarthritis	M01	14.3%	19%	-9.2%	14.8%
	N02	-6.3%	22%	23.9%	5.2%
Back pain	M01	-16.7%	-28%	-16%	2.7%
	N02	-15.4%	103%	53.5%	56%

The econometric analysis assessing the cost effects of the pilot using panel regression produced the results presented in Annex Tables 1.5 and 1.6 below.

ANNEX TABLE 1.5: Impact of PHC Plus on the Monthly Costs of Care, Number of Hospitalizations, and Length of Hospital Stay for All Participating Patients

MODEL OF COSTS OF SERVICES WITHIN...	PHC PLUS IMPACT ON MONTHLY COSTS – FULL TIME SAMPLE	CHANGE IN PHC PLUS IMPACT DUE TO THE PANDEMIC
All health care services	80.91 PLN	-27.91 PLN
PHC Plus and OSC	54.11 PLN	-29.92 PLN
OSC	4.24 PLN	0.84 PLN
Hospital care	24.46 PLN	-3.04 PLN
Rehabilitation	0.97 PLN	-0.72 PLN
Consultations (ICD9: 89)	37.84 PLN	-11.10 PLN
Cost of medicine	3.46 PLN	0.24 PLN
Number of hospitalizations	0.004	0
Length of stay in hospital	0.024 days	-0.003 days

ANNEX TABLE 1.6: Impact of PHC Plus on Monthly Costs of Care, Number of Hospitalizations, and Length of Hospital Stays for Patients Participating in Disease Management Programs

MODEL OF COSTS OF SERVICES WITHIN.../ PHC+ IMPACT ON MONTHLY COST OF CARE PER PATIENT IN PLN	TYPE 2 DIABETES	PRIMARY HYPERTENSION	CHRONIC CORONARY ARTERY DISEASE	CHRONIC HEART FAILURE	PERMANENT ATRIAL FIBRILLATION	ASTHMA	COPD	HYPOTHYROIDISM	PARENCHYMAL GOITER AND THYROID NODULE	PERIPHERAL OSTEOARTHRITIS	BACK PAIN
All health care services	84.76	86.64	126.9	262.2	155.1	62.29	93.26	65.84	114.7	109.6	114.5
PHC+ and OSC	49.47	52.55	61.57	54.47	74.45	61.9	71.74	58.0	80.82	90.28	93.76
OSC	0.41	1.81	1.8	2.88	-0.99	0.29	1.17	1.92	5.03	0.89	1.64
Hospital care	30.12	31.6	54.48	187.2	79.43	-2.09	25.98	3.13	28.76	15.64	21.38
Rehabilitation	1.2	0.43	7.64	9.19	0.79	0.46	-1.11	1.36	1.58	2.24	-0.22
Consultations	21.1	37.68	22.51	103.0	69.45	35.65	13.37	26.2	42.24	34.53	42.98
Cost of medicine	10.95	5.5	7.58	4.87	6.29	8.42	12.17	4.14	3.1	3.87	2.98
Number of hospitalizations	0.003	0.003	-0.002	0.002	0.01	-0.002	0.002	-0.002	0.004	0.001	0.002
Length of stay in hospital	0.026	0.023	0.024	0.045	0.033	0.012	0.05	0.007	0.03	0.021	0.018

None of these analyses took into consideration any of the capital investment costs or fixed costs received by facilities in the form of IT grants or grants to fund the position of the care coordinator.

ANNEX 2: LIST OF REPORTS PRODUCED AS PART OF M&E OF PHC PLUS PILOT IN POLAND

- Report No 1.** Implementation of Integrated Healthcare in Poland – Results Framework and Monitoring and Evaluation Plan
- Report No 2.1.** Analysis and evaluation of the service providers' initial readiness to implement the PHC Plus pilot program in Poland
- Report No 2.2.** Analysis and evaluation of the service providers' final preparation for the implementation of the PHC Plus pilot program in Poland
- Report No 3.2.1** Analysis of the PHC Plus pilot performance and progress between September 2018 and January 2019, based on the data provided by the National Health Fund in Poland
- Report No 3.2.2.** Analysis of PHC Plus pilot performance and progress between June 2018 and October 2019, based on the NHF AP-PKUŚ application data
- Report No 3.2.3.** The analysis of PHC Plus pilot performance and progress between June 2018 and October 2019 based on NHF AP-PKUŚ data / The analysis of service consumption by PHC Plus beneficiaries between June 2018 and June 2019 and between January 2015 and June 2019, based on NHF KLP data
- Report No 3.2.4.** The Analysis of PHC Plus Performance and Progress: Cardiology Disease Management Programs”
- Report No 3.2.5.** Analysis of diabetes services delivered in PHC Plus pilot to the population of type 2 diabetes chronic patients
- Report No 3.2.6.** Analysis of the PROM/PREM/PAM (HLS) tools used to M&E the Primary Health Care Plus pilot program in Poland
- Report No 3.2.7.** COVID-19 impact on PHC Plus pilot program implementation
- Report No 3.2.8.** Analysis of PROM / PREM / HLS tools used to M&E the Primary Health Care Plus pilot program in Poland - results of the second round of surveys
- Report No 3.2.9.** Mid-term report
- Report No 3.2.10.** Analysis of pulmonology services delivered in PHC Plus pilot to the population of chronic asthma and/or COPD patients

- Report No 3.2.11.** Analysis of spending on rehabilitation services delivered in PHC Plus pilot to the population of patients with chronic back pain syndrome and peripheral joint osteoarthritis
- Report No 3.2.12.** Economic evaluation of PHC Plus pilot model in Poland
- Report No 3.2.13.** Methodology of quantitative research, based on the National Health Fund databases, as part of monitoring and evaluation of PHC Plus pilot model in Poland

