Evaluating the impact of adult education programs in Morocco: a quasi-experimental approach

Rachid Boukbech
Department of Economics and Management, Ibn Tofail University, Kénitra, Morocco, and
Mariem Liouaeddine
Ibn Tofail University, Kénitra, Morocco

Abstract
Purpose – This paper aims to evaluate the impact of the “Postliteracy” program on the qualification of beneficiaries for socioeconomic integration. This qualification is achieved first through the consolidation of the achievements of individuals freed from illiteracy, and then through their support in creating income-generating activities by providing them with technical, economic, legal and institutional knowledge to ensure their conscious and responsible participation in local and regional development efforts.

Design/methodology/approach – To evaluate the impact of the “Postliteracy” program, this paper uses quasi-experimental methods with a control group (participants of the “Literacy” program 2020 / 2021) and a treatment group (participants of the “Postliteracy” program 2021 / 2022). Skill acquisition is measured through pretest and posttest evaluations using a questionnaire aligned with the National Agency for the Fight Against Illiteracy (ANLCA)-adopted curriculum. The survey occurred at the beginning and at the end of the program, providing sufficient time for skill development. The questionnaire includes three sections covering socioprofessional characteristics, technical and economic domains and legal and institutional aspects. These sections contribute to a score reflecting the acquired skills for successful socioeconomic integration.

Findings – The results of the study demonstrate that the “Postliteracy” program has a positive impact on the acquisition of competences necessary for improved socioeconomic integration of the beneficiaries. The various matching techniques reveal a score difference ranging from 12 to 14 points in favor of program participants compared to those who did not participate. The Difference-in-Differences method confirms the positive and significant impact of the program.

Practical implications – The findings highlight the importance of the “Postliteracy” program in national literacy policy, underlining the need to further strengthen its presence within the programs deployed by ANLCA, notably by increasing the number of beneficiaries targeted by this program. To achieve this, it would be advisable to increase the funds allocated to it within ANLCA’s budget.

Originality/value – The originality of this work is a unique research of the case of Morocco based on a microeconometric study for which the authors evaluate the impact of adult education by applying impact evaluation methods in the field of adult literacy.

Keywords Adult education, Microeconometric and policy evaluation, Impact evaluation, Morocco

Paper type Research paper
1. Introduction

Education is recognized as a key driver for social cohesion and economic prosperity, and it plays a crucial role in improving health, living conditions, social stability, and long-term economic growth. It is considered a major societal issue and a vital investment for a country’s future (Byrd, 2011; Nnyanzi and Kilimani, 2018; UNESCO, 2022). However, educational inequalities persist despite progress in access to education. Therefore, a major challenge is to combat these inequalities and adapt educational systems to the needs of the economy by diversifying forms of education to benefit all segments of the population. Formal, informal, and nonformal education are the three main forms of education that emerge in contemporary societies, with schools and families traditionally identified as the primary places of learning (Bordes, 2012; Berry and Garcia, 2016; OECD, 2020; Guedj and Urgelli, 2021).

Education can be classified into three main forms: formal education, which takes place in educational institutions and aims to obtain certificates or diplomas; informal education, which occurs in unstructured contexts such as family and social interactions; and nonformal education, which is a parallel process to traditional educational systems and does not involve official certification (Fordham, 1993; Scheerens, 2011; Jeffs and Smith, 2021). It is essential to recognize that the right to education applies to everyone, regardless of age, in accordance with the fourth Sustainable Development Goal (SDG) and international human rights (UNESCO, 2022).

The COVID-19 pandemic has underscored the importance of adult education and lifelong learning. Governments and communities must collaborate to develop effective learning strategies, focusing not only on the acquisition of knowledge and skills but also on supporting individuals in facing the economic and social consequences of the crisis (OECD, 2020; UNESCO, 2022).

Especially in developing countries, adult education plays a key role in social inclusion by helping individuals acquire basic skills in reading, writing, and numeracy, which are essential for successful socioeconomic integration. Illiteracy can hinder career opportunities and wage progression, making it crucial to address these issues to promote personal development and professional advancement.

Literacy, therefore, is a crucial element in enabling individuals to enter the workforce and participate fully in society. It allows them to develop their skills, increase their employability, and reduce the risks of social exclusion and poverty. Hence, it is important to provide quality literacy programs to help individuals acquire the necessary skills for success in both their professional and personal lives.

Empirically, numerous studies have been conducted about adult education. However, very few studies have focused on evaluating its socioeconomic effects, particularly in developing countries (Bynner and Egerton, 2001; Schwerdt et al., 2012). Most quantitative data regarding the impact of education have relied on learning indicators such as years of schooling or the highest educational qualification obtained. More recent studies, particularly since the 1990s, have started to examine the effects of adult education as a possible explanation for differences in economic and social development (Field, 2012).

In this regard, the present study aims to evaluate the impact of adult training programs in Morocco and demonstrate how they contribute to the socioeconomic integration of beneficiaries. To achieve this, we apply quasi-experimental methods (propensity score matching and difference-in-differences) to a sample of beneficiaries from the “Postliteracy” program implemented by the National Agency for the Fight Against Illiteracy (ANLCA) [1] in partnership with civil society organizations, benefiting individuals freed from the burden of illiteracy. The data collected for this evaluation pertain to the year 2021–2022.
Although similar studies have been carried out in other developing countries (Wambugu, 2011; Bandiera et al., 2020; Tawiah and Thusi-Sefatsa, 2022; Deshpande et al., 2023), to our knowledge, this study is unique and the first to analyze the impact of adult education on qualification to socioeconomic integration in Morocco.

The paper is structured as follows: Section 2 clarifies the concept of adult education and presents the review of empirical literature regarding its socioeconomic impact. Section 3 presents the survey approach to collect the necessary data for the study and the estimation methods. Section 4 discusses the empirical results. The final section concludes.

2. Literature review

2.1 Concepts of adult education and lifelong learning

The concepts of adult education and lifelong learning have been studied and analyzed by numerous authors and professionals from various fields such as sociology, psychology, economics, etc. The UNESCO, as an institution, has also contributed to this research by providing definitions, guidelines, and programs for adult education. These efforts have helped define and understand these concepts, highlighting the needs, opportunities, and challenges associated with adult education and lifelong learning. Furthermore, it has permitted the development of strategies and approaches to improve access and the quality of adult education, as well as to foster lifelong learning.

According to the UNESCO Institute for Lifelong Learning (UIL), lifelong learning is based on the interaction between learning and daily life. It encompasses all age groups, whether children, youth, adults, or elderly, regardless of gender. This learning takes place in different life contexts such as family, school, community, workplace, etc. It is manifested through various learning modalities, whether formal, nonformal, or informal, and aims to address a multitude of learning needs and demands (UIL, 2014; Hanemann and Robinson, 2022).

It is clear, therefore, that adult education constitutes an essential element of lifelong learning. Learning cannot be limited to compulsory or higher education. Lifelong learning is therefore a concept that sees learning as a process that develops from early childhood through to adulthood. It is therefore a conceptual framework and guiding principle for all forms of education, formal and informal, that help cultivate humanistic, democratic, inclusive and self-fulfilling values (UNESCO, 2019). As a result, lifelong learning represents the continuity of the learning and education process, which is reflected in the right to education by the fact that it begins at birth and continues throughout life. It encompasses all forms of education and learning, enabling adults to actively participate not only in the world of work but also in society as a whole (Ahmed, 2014; Rogers, 2019).

Beyond the UIL definition, different authors have taken an interest in understanding this complex phenomenon. According to Darkenwald and Merriam (1982), adult education is a process that enables adult individuals to develop new knowledge, skills, values, norms, and attitudes through regular and sustained learning activities. Its objective is to enhance knowledge and induce changes in attitudes, values, and skills.

Tight (2012) considers adult education as a practice in which adults engage in systematic and sustained self-education activities to acquire new forms of knowledge, skills, attitudes, or values. This encompasses all types of learning beyond traditional schooling, ranging from basic literacy to personal fulfillment as lifelong learners.

For Knowles et al. (2014), adult education is an approach aimed at assisting adults in learning, typically in a nonformal or informal setting, with a focus on their needs and interests. This comprehensive and inclusive approach takes into account the diversity of adult learners in terms of their backgrounds, experiences, and goals. The objective of adult
Adult education is to empower adults to become agents of their own learning, strengthen their knowledge and skills, increase their employment and career advancement opportunities, as well as actively participate in their community. It also aims to promote personal fulfillment and well-being of adults by helping them unleash their potential as individuals and members of society.

Adult education is defined by Merriam (2018) and Merriam and Baumgartner (2020) as any learning in which adults engage outside the traditional school framework, covering a wide range of activities from basic literacy to lifelong personal fulfillment. Its objective is to encourage and facilitate learning among adults, especially those who have not completed their formal education, in order to improve their quality of life and contribute to societal development. This definition highlights the multidimensional nature of adult education, encompassing various activities and extending beyond traditional teaching. It also includes opportunities for informal and nonformal learning. The primary goal of adult education is to enhance the quality of life and the participation of adult learners in society.

In summary, adult education is a concept that is constantly evolving and varies across contexts. However, due to its socioeconomic implications, it sparks numerous debates among education professionals and researchers and remains at the core of development policies and programs.

2.2 Socioeconomic impact of adult education

Adult education is increasingly important nowadays as it has a positive impact on socioeconomic performance. By equipping adults with necessary skills, it promotes their social inclusion and expands access to educational opportunities. This enables individuals to fully participate in society and benefit from economic opportunities, thus contributing to economic and social development (Cervero and Wilson, 2001).

Thus, by promoting adult education, individuals acquire the knowledge, skills and tools for personal and professional development that foster active citizenship, social integration and integration into the labor market (Alt and Raichel, 2018).

Adult education has direct positive outcomes on income, employability, and the overall economy. Additionally, it has beneficial indirect effects, as higher income and stable employment improve health, well-being, and social relationships (Field, 2012; Dohmen et al., 2016).

The benefits of adult education extend beyond short-term returns on investment. Individuals who receive education and training are less likely to experience unemployment and tend to see their wages increase (OECD, 2005). This translates into improved personal satisfaction, autonomy, health, personal security, and the quality of children’s education (Gilomen, 2003). Moreover, adult education can reduce criminal and antisocial behaviors by addressing fundamental needs and enhancing prospects for success (Feinstein, 2002).

Education has an impact on individuals’ social position, and access to education plays a crucial role in their position within the social hierarchy. Adult education can contribute to reducing overall inequalities by providing more learning opportunities (Verba et al., 1978; Campbell, 2006; Desjardins and Schuller, 2006; Kosyakova and Bills, 2021).

Furthermore, adult education can influence the socioeconomic environment in which individuals operate, whether within the family, the workplace, or the community. Through education, adults can exert a certain level of power and influence the conditions that shape their choices, opportunities, and resource distribution through collective action (Schuller and Desjardins, 2010).

According to Feinstein and Hammond (2004), adult learning can also have an impact on the development of psychological resilience, self-efficacy, and well-being. By strengthening
components such as self-esteem, hope, and motivation, adult learning can foster personal satisfaction and increase self-confidence resulting from the completion of a course, understanding of new subjects, or accomplishment of new tasks.

The benefits of adult learning can be categorized into different types: private, public, and both monetary and nonmonetary (Table 1) (ICDET, 2020).

Nonmonetary benefits at the individual level, although highly valued by adult learners, cannot be directly exchanged in markets and therefore do not have a direct monetary value (McMahon, 1999; Wolfe and Haveman, 2002; Psacharopoulos, 2006; Stacey and Behrman, 2010). These benefits encompass aspects such as the value of acquiring new knowledge and skills, improvements in health and overall life satisfaction, as well as enhancements in family life (Schuller, 2001; Lee and Desjardins, 2019). On the other hand, nonmonetary public benefits pertain to the broader society, beyond the learners themselves, and include reductions in crime rates, increased trust, social cohesion, political stability, and the effective functioning of democracy.

Additionally, private monetary benefits involve improvements in the health of individuals and their families, which, in turn, can lead to public monetary benefits. It is important to note that these different benefits are interconnected and not independent of one another (McMahon, 1999). The public monetary benefits resulting from adult learning contribute to decreased social welfare transfers and reduced public expenditures on healthcare.

2.3 Overview of empirical studies
Adult education is central to programs and public policies in both developing and developed countries. A significant number of empirical studies have been conducted on adult education. However, very few have focused on evaluating its socioeconomic effects (Bynner and Egerton, 2001; Schwerdt et al., 2012). Most quantitative data concerning the impact of education rely on learning indicators, such as years of schooling or the highest educational qualification obtained. Since the 1990s, more recent studies have begun to explore the effects of adult education as a possible explanation for differences in economic and social development (Field, 2012). The findings of these studies vary considerably across different data sets, depending on the estimation methods and the type of function used. Early studies on the impact of adult education faced a major challenge, namely the absence of a counterfactual and the presence of selection bias. To overcome these limitations, recent research has employed microeconometric methods for program evaluation.

Empirical research in developed countries describe a broad view of adult education socioeconomic effects on the lifestyle of specific individuals, especially among elderly adults. Feinstein and Hammond (2004), Duckworth and Cara (2012), and Manninen et al. (2014)

<table>
<thead>
<tr>
<th>Effect</th>
<th>Private</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monetary</td>
<td>Wage earnings</td>
<td>Tax revenues</td>
</tr>
<tr>
<td></td>
<td>Income</td>
<td>Cost of social transfers</td>
</tr>
<tr>
<td></td>
<td>Productivity</td>
<td>Health care costs</td>
</tr>
<tr>
<td>Non monetary</td>
<td>Health status</td>
<td>Social cohesion</td>
</tr>
<tr>
<td></td>
<td>Life satisfaction</td>
<td>Political stability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Well-functioning democracy</td>
</tr>
</tbody>
</table>

Table 1. Socioeconomic effects of adult education
Source: ICDET (2020)
show that continued learning significantly impacts on human health, social life and general well-being. Implemented changes are reflected in shifts to attitudes, behaviors, and increased participation in civic activities among learners.

Interventions aimed at boosting adult participation in learning programs have shown significant results. The distribution of the vouchers increases the probability of adults undertaking training programs, especially those with low levels of education and no prior training (Messer and Wolter, 2009). Similarly, Ksoll et al. (2014) emphasize the success of mobile learning in skill acquisition. They argue that the flexibility provided by Mobile Supported Learning (MSL) is a major factor in this success, as learners can access support at any time or place.

The economic impact of adult education presents more nuanced results. While Schwerdt et al. (2012) report no significant average effect on income or employment, Ruhose et al. (2019) suggest positive externalities of vocational training, such as improved social capital and individual incomes over time.

Furthermore, Duckworth and Cara (2012) reveal that motivations for adult learning vary widely, with a preference for professional qualifications later in life. The joy of learning and personal interest also plays remarkable roles in driving participation, especially among inactive individuals seeking enrichment.

Regarding developing countries, much research analyzed the impact of adult education on many socioeconomic aspects. The synthesis highlights a gap in research on the effects of adult education in developing countries, particularly regarding illiteracy, emphasizing the need for further studies, such as examining adult education programs in Morocco.

For instance, Wambugu (2011) utilized multinomial logit models on national data from Kenya to reveal that higher education levels correlate with increased access to salaried jobs, particularly in the public sector, while lower education levels tend to lead individuals toward informal sector employment. Similarly, Bandiera et al. (2020) conducted a randomized controlled trial in Uganda, demonstrating that an intervention combining vocational training and sex education led to a 48% increase in income-generating activities among adolescent girls, as well as a one-third reduction in early pregnancies and cases of nonconsensual sex.

Using a qualitative approach, Tawiah and Thusi-Sefatsa (2022) showed that Adult and Community Education and Training (ACET) holds up social-women’s economy in South Africa despite access problems linked to budgetary and geographical limitations. This targeted education increases women’s bargaining power, retards the beginning of parenthood and marriage, and builds up their skills. In addition, a randomized controlled experiment conducted in India by Deshpande et al. (2023) found that rural mothers significantly improved their hygiene practices and showed greater interest in raising their children.

The results of these studies highlight the many benefits that adult education delivers. They also underscore that quick and automatic of these benefits should not be expected. The success of adult education programs depends on external factors such as social norms and cultural practices. Furthermore, the specific impact on illiteracy remains underexplored, emphasizing the need for further research in this critical area. In this regard, the purpose of this work is to fill this gap by analyzing the case of adult education programs in Morocco.

3. Data and methodology
3.1 Program design
Morocco, located in North Africa, has an estimated population of 33,848,242 (HCP, 2014) and a Human Development Index of 0.683 (UNDP, 2021). Its GDP per capita, adjusted for
purchasing power parity (PPP), is $8,083 USD (World Bank, 2022), which is 46% of the global average, classifying it as a developing country by the World Bank. With public expenditures in the education sector representing 5.8% of GDP (World Bank, 2022), an illiteracy rate of 32% (HCP, 2014), low educational outcomes, and moderate efficiency (Liouaeddine et al., 2017; Boukbech and Liouaeddine, 2023), the country has undertaken many reforms to improve education quality, enrollment rates, and human capital.

Thus, the Moroccan government has implemented adult education programs through several initiatives. Among these, the “Literacy” and “Postliteracy” programs are deployed by the National Agency for the Fight Against Illiteracy (ANLCA) in partnership with civil society organizations across the entire national territory.

The first program ("Literacy") aims to master basic skills in reading, writing, and arithmetic, with a total of 300 instructional hours. The second program (“Postliteracy”) also consists of 300 instructional hours and aims to consolidate the achievements of individuals who have been freed from illiteracy, as well as acquire skills related to technical, economic, legal, and institutional domains (200 h). Additionally, this program prepares beneficiaries for socioeconomic integration through vocational initiation activities (100 h).

The main objective of our study is to evaluate the impact of the “Postliteracy” program on the qualification of beneficiaries for socioeconomic integration. This qualification is achieved first through the consolidation of the achievements of individuals freed from illiteracy, and then through their support in creating income-generating activities by providing them with technical, economic, legal, and institutional knowledge to ensure their conscious and responsible participation in local and regional development efforts. The theory of change, which explains how the program is expected to produce the desired outcomes, is presented in Figure A1 in Appendix.

### 3.2 Sample selection

The impact evaluation of the “Postliteracy” program focuses on two provinces, “Elhajeb” and “Ifrane,” during the year 2021 / 2022. The choice of the two regions is based on many reasons: The first, according to High Commission for Planning (2014), illiteracy rates in the two provinces are higher than the national average (32%). The two provinces of “Elhajeb” and “Ifrane” have respectively an illiteracy rate of 34.7% and 38%. The second, illiteracy in Morocco is mainly a female and rural phenomenon. The chosen areas are predominantly rural (74% of the municipalities in El Hajeb and 80% in Ifrane), with rural illiteracy rates of 44.8% in El Hajeb and 53.1% in Ifrane. The third, the predominance of women in the evaluated program is because illiteracy affects women more than men. In El Hajeb, 48.8% of women are illiterate compared to 26.3% of men, and in Ifrane, 47.4% of women compared to 28.2% of men.

We must mention that this study was also possible with the availability of the administrative database. The choice of the two groups (Figure A2 in Appendix), control and treatment, is justified by the importance of having the same characteristics, on one hand, and the need for individuals to share common basic skills in terms of reading, writing, and arithmetic before the survey is launched, on the other hand.

The control group consists of individuals who underwent the “Literacy” program in 2020/2021, while the treatment group consists of those who participated in the “postliteracy” program in 2021 / 2022. The two groups are selected to obtain a counterfactual that allows for identifying the effects of the “postliteracy” program on qualification for socioeconomic integration.

The administrative database is based on an annually survey of cognitive skills among illiteracy program beneficiaries. The survey has been conducted in the first phase on a
sample of 1957 individuals, with 881 in the control group and 1146 in the treatment group. Considering the attrition rate of approximately 2% in our study - which is considered minimal and not having a significant impact on the results - the second phase of the survey focused only on a final sample composed of 1913 participants:

- 778 in the control group, the vast majority of whom (97%) are women, and 42% of the respondents live in rural areas, and
- 1135 in the treatment group, with 98% being women.

It should be noted that the proportion of people living in rural areas in this group is higher, at a proportion of 62%. The data from these two groups are presented in Table 2.

The measurement of the level of acquisition of skills related to the program (pretest and posttest) is done through a developed evaluation questionnaire based on the curriculum intended for beneficiaries of the “postliteracy” program adopted by the ANLCA [2].

To understand the conditions and determine the means of implementing the survey and test the validity of the questions developed and the relevance of the proposed responses, a pilot survey was conducted with 75 individuals [3] from the El Hajeb province. This pilot phase allowed for some modifications to be made to finalize the questionnaire.

Thus, the final survey was conducted for both groups (control and treatment) in two stages: at the beginning of the program (March 2021) and at the end of the program (December 2021). This choice is motivated by the desire to observe the potential evolution of the program by giving beneficiaries sufficient time for the development of the targeted skills.

The administered questionnaire comprises three sections. The first section concerns socioprofessional characteristics (environment, age, gender, marital status, etc.). The second section includes questions related to technical and economic domains. The last section includes questions related to legal and institutional domains. These last two sections allow for the calculation of a score that reflects the degree of acquisition of skills aimed at successful socioeconomic integration [4].

Overall, the questionnaire contains 26 cognitive questions grouped into two sections. The first section includes 13 questions regarding technical and economic skills, while the second section includes 13 questions regarding legal and institutional skills. The responses obtained are utilized to calculate a score that reflects the extent of skill acquisition targeted by the program. This score serves as the outcome variable for the impact assessment of the program in question. After conducting a pilot survey to assess the relevance and validity of the formulated questions and make necessary adjustments, the adopted methodology and the results were discussed with stakeholders, including representatives of civil society associations and certain ANLCA key experts. This approach involves the comparison of the results obtained played an essential role in validating and interpreting the findings; thereby enhancing the study’s robustness and ensuring adequate consideration of various perspectives in the overall analysis.

<table>
<thead>
<tr>
<th>Milieu</th>
<th>Control</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td>Rural</td>
<td>299</td>
<td>680</td>
</tr>
<tr>
<td>Urban</td>
<td>454</td>
<td>429</td>
</tr>
<tr>
<td>Total</td>
<td>753</td>
<td>1109</td>
</tr>
</tbody>
</table>

**Source:** Authors calculation

Table 2. Distribution of individuals by group, gender and location.
3.3 Empirical methodology

Several methods are used in impact assessments, which can be grouped into two categories: experimental and quasi-experimental methods. The first ones involve conducting Randomized Controlled Trials (RCTs). The advantage of using a randomized evaluation is that it allows identifying causal impact by randomly selecting, from the eligible population, the population receiving the public intervention and the control group (Kendall, 2003).

When the rules of random assignment are not feasible, impact assessments turn to the second category. This latter category includes the following three quasi-experimental methods:

1. Propensity Score Matching (PSM) method,
2. Difference-in-Differences (DD) method, and
3. Regression Discontinuity (RD) method.

For the program under our evaluation, the randomness aspect is not satisfied. The selection of beneficiaries is carried out through a call for proposals targeting civil society organizations. These organizations, upon submitting project proposals, are responsible for mobilizing, raising awareness, and enrolling beneficiaries within their operational territories into the relevant program. Therefore, there arises a necessity to employ quasi-experimental methods in the impact evaluation of the “Postliteracy” program. Additionally, due to the absence of a continuous eligibility indicator that can differentiate program beneficiaries from nonbeneficiaries, we utilize the propensity score matching method along with the difference-in-differences approach (Gertler et al., 2016).

The use of microeconometric impact evaluation techniques is motivated by the need to identify the impact of a program, ideally by comparing the scores of beneficiaries of the “Postliteracy” program with those of the same beneficiaries in the absence of this program. Since it is impossible to observe the same individual in these two different scenarios, it is possible to rely on a control group that exhibits very similar observable characteristics to the treated group. This is where the method of propensity score matching (PSM) becomes interesting.

3.3.1 Propensity score matching. The PSM method was proposed by Rosenbaum and Rubin in 1983. It explores causal relationships by comparing two groups: the treated group and the untreated or control group. This approach helps to reduce selection bias by preventing the attribution of the sole difference in observed scores between the two groups of individuals to the simple presence or absence of program benefits.

Mathematically, the treatment effect \( \alpha_{it} \) for an individual \( i \) at time \( t \) is defined as the difference between the potential outcome \( Y^T_{it} \) when a literacy program is provided and the potential outcome \( Y^C_{it} \) when it is not. Thus, T refers to the treatment and C to the control group. This difference can be formalized as follows:

\[
\alpha_{it} = Y^T_{it} - Y^C_{it}
\]  

The result of this difference is called the population average treatment effect (ATE) and can be expressed as follows, with \( \text{E}(\cdot) \) the mathematical expectation:

\[
ATE = \text{E}(Y^T_{it}) - \text{E}(Y^C_{it}) = \text{E}(Y_{it} | T_i = 1) - \text{E}(Y_{it} | T_i = 0)
\]  

Given that the same individual cannot be observed in two different situations, with and without a program, the appropriate estimator becomes the ATT, the average treatment effect on treated individuals, which is given by the following formula:
The problem in this case is that we cannot observe how individuals in the control group would behave if they had benefited from a literacy program. Thus, the second part of the term \( E(Y_{i0} | T_i = 1) \) is only hypothetical and cannot be estimated directly. We need to find a substitute for this unobservable situation, for which the following equation is valid:

\[
E(Y_{i0} | T_i = 1) - E(Y_{i0} | T_i = 0) = 0
\]

This equation shows that the expected mean outcome value must be identical for both groups if they share the same distribution of observable characteristics [5]. Estimating this counterfactual is known as the fundamental problem of causal inference. To this end, Rosenbaum and Rubin (1983) introduced a solution based on the propensity score matching (PSM) method.

PSM constructs a statistical comparison group (or counterfactual) based on a probability of participating in treatment \( T \) conditional on observed characteristics \( X \), where the propensity score is represented by \( P(X) = Pr(T = 1 | X) \). This is a number between 0 and 1 that summarizes all the observed characteristics of the individuals in the sample. The use of this matching method is based on certain fundamental assumptions (Gertler et al., 2016).

The first is called the assumption of conditional independence and assumes that all covariates \( X \) contain all the necessary information to characterize potential outcomes. The second assumption is based on the problem of dimensionality, as the number of individuals to match increases, there is a risk of not obtaining enough corresponding units for each program participant. The third assumption, on the other hand, relates to the problem of common support. It is possible that there is no similar propensity score for a unit between the treatment group and the control group. This condition ensures the existence of sufficient matching between the covariates \( X \) of treated and untreated individuals.

### 3.3.2 Difference-in-differences estimation

The propensity score matching (PSM) method raises a significant issue, namely the existence of unobservable characteristics among individuals. In this regard, the application of the difference-in-differences (DID) technique will allow us to compare the differences in outcomes over time between the treatment group and the comparison group. However, solely observing the change in outcomes before and after the implementation of the program is insufficient to measure its causal effect. Comparing individuals who have benefitted from a literacy program to those who have not would be misleading because unobservable factors that vary over time could influence some individuals to benefit while others do not.

The difference-in-differences (DID) [6] method compares the difference between the observed scores for individuals with and without a literacy program before and after, and by subtracting the first effect from the second, we control not only for the effect of observable characteristics but also for the effect of unobserved time-invariant characteristics (Gertler et al., 2016).

If we consider two periods \( t = 0 \) (before the program) and \( t = 1 \) (after the program), \( T \) the treatment status and \( Y_i^T \) and \( Y_i^C \) the respective results for treated and untreated individuals for time \( t \). The estimated average impact of the program is then given as follows:

\[
DD = E\left( Y_{i1}^T - Y_{i0}^T | T_1 = 1 \right) - E\left( Y_{i1}^C - Y_{i0}^C | T_1 = 0 \right)
\]
\[ Y_{it} = \alpha + \beta T_{it} + \rho T_{it} + \gamma t + \epsilon_{it} \]  

(6)

In this expression, the coefficient \( \beta \) represents the average program effect (ATT), given by the interaction between the postprogram treatment variable \( T_{it} \) and time \( t \). In addition to this interaction term, these variables are included separately to capture any distinct average effect of time, as well as the effect of being a beneficiary or not.

4. Results and discussion

4.1 Matching method results

The estimation results for marginal effects, which pertain to the probability of participating in the “Postliteracy” program based on different characteristics, indicate that gender, number of children, and field of activity do not significantly influence participation. However, participation in the program decreases with increasing age (Table 3). However, participation in the program decreases with increasing age (Table 3). This decline may result from older individuals’ reduced motivation to acquire new skills, leading them to prefer withdrawing from the labor market as they age, and consequently, from training programs (Chariot, 2005). Several factors could contribute to this demotivation. Firstly, deteriorating health with age could hinder increased participation rates (Boissonneault and Vilotitch, 2017). Secondly, the jobs offered by the program may not align with these individuals’ personal or professional interests and goals, which could discourage their participation (Tawiah and Thusi-Sefatsa, 2022).

The results also indicate a tendency toward lower participation in the “Postliteracy” program for individuals residing in urban areas. This trend can be attributed to several factors, including the program’s focus on skill acquisition. While the program may be perceived as a unique opportunity in rural areas, since it is mainly the only illiteracy program provided in the rural area in Morocco, it faces intense competition in urban regions from other providers, such as artisans, pastry chefs, and beauty schools. Furthermore, in urban areas, the program’s target audience may have greater family and professional responsibilities, as well as more options for entertainment. In contrast, rural areas may lack diverse learning and social spaces, making postliteracy training centers the primary venues for education, entertainment, and community interaction.

Furthermore, the results reveal a decline in participation trends within the “Postliteracy” program when the spouse is employed. This could be attributed to the family responsibilities undertaken by the nonworking spouse, particularly among women who constitute 97% of our sample. Additionally, the sociocultural context that traditionally assigns the role of homemaker to the wife could also play a significant role.

| Variable              | dy/dx  | Std. Err. | z     | P>|z| | [95% Conf. Interval] |
|-----------------------|--------|-----------|-------|------|----------------------|
| Gender                | 0.0067204 | 0.0777353 | 0.13  | 0.900 | -0.142638 0.1620788  |
| Age                   | -0.240465 | 0.0804779 | -2.99 | 0.003 | -0.3981988 -0.0827312 |
| Location              | -0.2008565 | 0.0570285 | -3.52 | 0.000 | -0.3126302 -0.0890828 |
| Employment partner    | -0.139798 | 0.0672953 | -2.08 | 0.038 | -0.2716943 -0.0079017 |
| No. of children       | 0.0376824 | 0.0407696 | 0.92  | 0.355 | -0.0422246 0.1175895  |
| Sector of activity    | 0.0086811 | 0.0204040 | 0.36  | 0.718 | -0.0384373 0.0557992  |

Table 3. Estimation of propensity scores (probit model: marginal effects at the mean)

Note: Coefficient significance: **5%; ***1%
Source: Authors calculation
A crucial step in the analysis is to verify the presence of common support in the distribution of propensity scores. This ensures that individuals who are likely to benefit from the program exhibit similar propensity scores to those who are not yet beneficiaries. Figure 1 illustrates the overlapping distributions of scores, indicating that nearly every nonbeneficiary individual in the program has a propensity score close to those who have benefited from it. This suggests sufficient similarities between the two groups, which is essential for establishing the impact evaluation of the studied program.

Matching between treated and untreated individuals is achieved using various algorithms, including the Nearest Neighbor Matching method, which involves searching for individuals with the closest scores; Kernel Matching, which employs weighted averages of all control group units to estimate the counterfactual outcome; Radius Matching, which imposes a tolerance threshold on the maximum distance between propensity scores of treated and untreated individuals; and Stratification Matching, which entails generating strata where individuals possess similar propensity score values, thereby creating balanced distributions of covariates.

These estimation methods can be used together because, according to Smith and Todd (2005), these different matching techniques generally yield similar results. Since there is no consensus on the best estimation method, we have chosen to employ all four matching procedures. Using multiple matching methods allows us to address the potential limitations and biases associated with any single method. By comparing the results obtained from each approach, we can gain a more comprehensive understanding of the impact of the “Postliteracy” program on the outcomes of interest.

The results obtained from various matching methods reveal that the Average Treatment Effect (ATT) ranges from 11.751 to 12.991 points, as indicated in Table 4. These findings demonstrate that individuals who participated in the “Postliteracy” program attained a score approximately 12 points higher than those who did not undergo the program. This observation suggests a positive impact of the “Postliteracy” program on skill acquisition, aiming to enhance the socioeconomic integration of the beneficiaries.

Furthermore, it is essential to acknowledge that other factors might also impact the enhancement of participants’ scores in the evaluated program. These factors encompass unobservable elements such as family support, personal motivation, and the socioeconomic

![Figure 1. Common support distribution](image-url)
environment. To address these unobservable disparities, we have employed the difference in differences method.

This approach enables us to isolate the distinct impact of the “Postliteracy” program by comparing the differences before and after the program for both the program group and the control group. Through controlling for these unobservable variables, we can more accurately attribute the improvement in scores to the direct influence of the program itself.

Hence, these results suggest a significant positive effect of the “Postliteracy” program on skill acquisition, aimed at fostering the socioeconomic integration of the beneficiaries. This positive effect persists even after accounting for other potential factors that may contribute to score improvement.

4.2 Difference-in-differences estimation

The application of the DD method confirms the positive and significant impact of the “Postliteracy” program. The ATT ranges from 13.112 to 14.301 (Table A1 in Appendix), indicating that participants in this program exhibit an average score 14 points higher than nonparticipants. The estimates also highlight a gender disparity, as men tend to achieve higher scores compared to women. However, this result should be interpreted cautiously given that men constitute only 3% of our sample. Nevertheless, it’s worth noting that, despite the small number, male participants in the program appear to be more dedicated, enrolling with the specific goal of enhancing their economic integration. This observation contrasts with the situation for women, who view adult education programs more as avenues for personal growth and social interaction with peers, particularly in rural areas, rather than primarily for economic integration. In sum, regarding gender, the impact of the illiteracy program is not significant because of the small number of male participants in this program.

The results also indicate a positive correlation between age and the attained score. This suggests that the older an individual is, the higher their score in the program tends to be. This relationship can be attributed to the maturity of the beneficiaries, which may contribute to improved scores as adult education builds upon their life experiences. Additionally, the demand for vocational training and integration tends to increase with age (Elleman and Oslund, 2019; Yamashita et al., 2022). This finding aligns with results obtained by Aït Daoud et al. (2014).

Individuals engaged in income-generating activities (IGA) tend to achieve higher scores, with a 65% probability of outperforming those without a source of income. The program’s targeted skills are further enhanced for those already working in a specific professional field, while they encompass new areas of learning for the unemployed. Moreover,

<table>
<thead>
<tr>
<th>Method</th>
<th>ATT</th>
<th>Scores Std. Err</th>
<th>T-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel</td>
<td>12.445</td>
<td>0.672</td>
<td>18.512***</td>
</tr>
<tr>
<td>Nearest neighbor</td>
<td>12.991</td>
<td>1.073</td>
<td>12.112***</td>
</tr>
<tr>
<td>Radius</td>
<td>11.751</td>
<td>1.041</td>
<td>11.290***</td>
</tr>
<tr>
<td>Stratification</td>
<td>12.670</td>
<td>0.568</td>
<td>22.966***</td>
</tr>
</tbody>
</table>

Table 4. Results of average treatment effect (ATT)

Note: Coefficient significance ***1%

Source: Authors calculation
beneficiaries involved in IGAs could apply the knowledge and insights gained from the program.

Individuals working in the commerce sector are more likely to achieve better performance. This may be attributed to the competitive and dynamic nature of the field, which encourages individuals to develop skills such as communication, negotiation, and problem-solving, all of which contribute to better achievements. Additionally, working in the commerce sector can offer career development and advancement opportunities, thereby stimulating individuals’ motivation to attain high levels of performance (ILO, 2010; Johari and Jha, 2020).

Individuals working as permanent or temporary employees have a higher likelihood of succeeding in the program and achieving high scores compared to those engaged in self-employment. This could be explained by the fact that having a source of income as an employee is conducive to learning, especially if the income is stable and the work schedule is regular and predictable, as is the case for permanent employees. On the other hand, self-employed individuals may face challenges related to irregular working hours and unpredictable and unstable sources of income (Von Hippel et al., 1997; Kahn, 2018; Struckell et al., 2022).

The results of the impact evaluation estimation of the adult education program using the PSM model reveal that beneficiaries whose spouses are employed are less likely to participate in the program, whereas the results of the DD model estimation revealed that this category of beneficiaries achieves higher scores than unmarried individuals. The opportunity to enroll in the program would be a consensual family choice that addresses a socioprofessional need likely to improve the household’s living conditions (Hussain and Raihan, 2022).

5. Conclusion

Adult education is one of the key factors for the socioeconomic integration of individuals. It enables them to acquire skills and knowledge that help improve their personal and professional situations and adapt to changes in the world of work. This education can assist adults in finding new jobs by creating or developing income-generating activities, leading to an increase in their income level and social status.

Furthermore, adult education can also contribute to the formation of a more inclusive and just society by providing educational opportunities to individuals who did not have the chance to pursue further studies earlier in life. This can help break the cycles of poverty and promote equal opportunities for all.

The objective of this paper is to evaluate the impact of the adult education program called “Postliteracy” on the qualification of beneficiaries for socioeconomic integration in Morocco. The study is based on a sample of 1913 participants divided into two groups: 778 individuals in the control group and 1,135 in the treatment group. To do so, we employed two quasi-experimental methods: Propensity Score Matching (PSM) and the Difference-in-Differences (DD) method.

The results of the study demonstrate that the “postliteracy” program has a positive impact on the acquisition of competences necessary for improved socioeconomic integration of the beneficiaries. The various matching techniques reveal a score difference ranging from 12 to 14 points in favor of program participants compared to those who did not participate. The Difference-in-Differences method confirms the positive and significant impact of the program.
These findings highlight the importance of the “Postliteracy” program in the national literacy policy and the need to further strengthen its presence within the programs deployed by the ANLCA, particularly by increasing the number of targeted beneficiaries.

In terms of prospects, further research could expand the sample of this study to include all beneficiaries of the “Postliteracy” program at the national level. Additionally, other programs deployed by the ANLCA could be subjected to impact evaluations. Additional research could focus on analyzing the impact of adult education on labor market integration, including employment rates, wages, and working conditions, by tracking the trajectories of beneficiaries after the program. Moreover, identifying the educational needs of adults in different contexts and exploring strategies to meet these needs would constitute another research avenue. Furthermore, studying and analyzing the barriers that prevent adults from accessing education and proposing solutions to overcome them would allow for a better understanding of the importance of adult education and its role in socioeconomic integration.

Notes
1. In French: Agence Nationale de Lutte Contre l’Analphabétisme.
2. The manual is entitled “Literacy for qualification: post-literacy program and socio-economic integration”. It should be noted that the questionnaire was validated by andragogy resource persons from this institution.
3. Including 69.3% in rural areas and 64% aged 34 and older.
4. The first two parts of the questionnaire consist of 13 questions. The score is calculated as the average obtained (N/26).
5. The matching method is based solely on observed characteristics. It is not possible to include unobserved characteristics in the calculation of the propensity score (Gertler et al. 2016; Chabé-Ferret et al. 2017).
6. The difference-in-differences method is based on the fundamental assumption of parallel trends. In other words, it is assumed that in the absence of the program, the change in outcome between the treated entities and the comparison group would evolve in parallel, whether it be an increase or a decrease, despite the absence of treatment (Gertler et al., 2016).

References


**Further reading**


**Corresponding author**

Rachid Boukbech can be contacted at: boukbech.rachid@gmail.com
Figure A1. Theory of change for the “Postliteracy” program

Source: Prepared by authors

Figure A2. Selection of control and treatment groups

Source: Prepared by authors
### Table A1. Results of the DD method

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treat</td>
<td>14.07378*** (0.1789418)</td>
<td>13.31897*** (0.3024569)</td>
<td>13.2305*** (0.3022476)</td>
<td>14.06538*** (0.1800304)</td>
<td>13.3618*** (0.302993)</td>
</tr>
<tr>
<td>Location (urban)</td>
<td>0.0624604 (0.1676513)</td>
<td>0.0.408748 (0.3129547)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>1.685221*** (0.5531413)</td>
<td>1.878139*** (0.5442752)</td>
<td>2.0152*** (0.5306883)</td>
<td>1.56634*** (0.5801614)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.055897*** (0.3471915)</td>
<td>0.36564* (0.2185641)</td>
<td>0.36564* (0.2185641)</td>
<td>0.9386985 (0.375296)</td>
<td></td>
</tr>
<tr>
<td>Spouse’s occupation Single (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IGR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field of activity Agricultural (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handicrafts</td>
<td>−0.243874 (0.3444087)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>0.904948** (0.3035768)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td>0.1349077 (0.4747501)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>−0.5727148 (0.7971334)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of activity Self-private (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent employee</td>
<td>1.890509*** (0.7182293)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary employee</td>
<td>0.5124441*** (0.2967776)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>5.001115***</td>
<td>5.676785***</td>
<td>4.687842****</td>
<td>4.33047 ***</td>
<td>4.579994***</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.6179</td>
<td>0.6131</td>
<td>0.6087</td>
<td>0.6205</td>
<td>0.6154</td>
</tr>
</tbody>
</table>

**Notes:** standard deviation in parentheses, *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

**Source:** Authors' calculation
<table>
<thead>
<tr>
<th>Variables</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (urban)</td>
<td>0.3080709</td>
<td>-0.2401091</td>
<td>-0.2542951</td>
<td>-0.2149909</td>
<td>-0.2048266</td>
</tr>
<tr>
<td>Sex</td>
<td>1.854191***</td>
<td>2.683926***</td>
<td>2.69844***</td>
<td>2.317875***</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spouse’s occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>0.0884473</td>
<td>0.0863339*</td>
<td>-0.1234613</td>
<td>-0.0966256</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>0.3963339*</td>
<td>0.2450497</td>
<td>0.0578659</td>
<td>0.5178659**</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>0.5135888</td>
<td>0.2450371</td>
<td>0.2723487</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IGR</td>
<td></td>
<td></td>
<td>0.6522339***</td>
<td>-0.1234613</td>
<td></td>
</tr>
<tr>
<td>Field of activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handicrafts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-private (ref.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent employee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary employee</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>4.917879***</td>
<td>4.478518***</td>
<td>4.621119***</td>
<td>4.86898***</td>
<td>0.6387***</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.5938</td>
<td>0.6190</td>
<td>0.6382</td>
<td>0.6382</td>
<td>0.6387</td>
</tr>
</tbody>
</table>

Table A1. Adult education programs in Morocco